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CONTRACT 188

BOARD OF WATER SUPPLY

OF THE

CITY OF NEW YORK

Information for Bidders, Forms of Bid, Contract, Bonds and Certificates, Specifications and Drawings

FOR FURNISHING AND DELIVERING

GATE AND PRESSURE-REGULATING VALVES AND APPURTENANCES

FOR THE

CITY TUNNEL

OF THE

CATSKILL AQUEDUCT

IN THE CITY OF NEW YORK

1917

INFORMATION FOR BIDDERS

Work to be done.

This contract is for furnishing and delivering gate-valves and pressure-regulating valves, together with their operating mechanisms and appurtenances, complete in every respect, ready for use, in the numbers and sizes designated, and for furnishing and delivering iron and steel castings, bolts, nuts and bronze billets for the City tunnel of the Catskill aqueduct. All of the above are to be delivered f. o. b. at designated stations (rail or water) within the limits of the City of New York.

Date for opening bids

Sealed bids for performing the work described herein will be received by the Board of Water Supply, at its offices, twenty-second floor, Municipal Building, Park Row, Centre and Chambers streets, New York City, until

at 11 A. M., at which place and time they will be publicly opened by the Board and read; the award of the contract, if awarded, will be made by the Board as soon thereafter as practicable.

Printed form for bids.

All bids must be made upon the blank form of bid attached hereto and should give the price for each item of the work proposed, both in writing and in figures, and must be signed and sworn to by the bidder, in accordance with the directions in the form of bid. Each bid must be enclosed in the printed envelope provided for the purpose by the Board, and sealed.

Certified check.

No bid will be received and deposited unless accompanied by a certified check upon a National or State bank, drawn and made payable to the order of the Comptroller of The City of New York, for three thousand five hundred dollars ($3,500) for the proper execution of the contract. Such check must not be enclosed in the sealed envelope containing the bid, but shall be delivered to the Board, or its Secretary, who will give a proper voucher for the deposit. All such deposits, except that

Checks returned.

made by the bidder to whom the contract shall be awarded, will be returned to the person or persons making the same as soon as possible and before the expiration of 3 days after the decision as to the award of the contract.

Bonds required.

Two or more bonds, the aggregate amount of which shall be sixty thousand dollars ($60,000), will be required for the faithful performance of the contract. Each bond must be signed by the Contractor and the sureties. The sureties and the amount in which each will qualify must be satisfactory to the Board.

Substitution of surety.

Should any surety upon the contract be deemed unsatisfactory at any time by the Board, notice shall be given to the Contractor to that effect and the Contractor shall forthwith substitute a new surety or new sureties satisfactory to the Board. No further payment shall be deemed due or shall be made until the new surety or new sureties shall qualify and be accepted by the Board.

Time for executing contract and bonds.

The bidder whose bid shall be accepted will be required to attend at the office of the Board in person, or if a corporation, by a duly authorized representative, with the sureties offered by him, and to execute the contract and bonds within 10 days after due notice that the contract has been awarded to him;

Deposit may be forfeited.

in case of failure or neglect so to do, the amount of the deposit made by him shall be forfeited to, and be retained by, the said City as liquidated damages for such failure or neglect, and shall be paid into the general fund of said City pursuant to the provisions of Section 30 of Chapter 724 of the Laws of 1905. If the said bidder to whom the contract is awarded shall execute the contract and furnish the said security within the time aforesaid, the amount of his deposit will be returned to him.

Time for beginning and completing work.

The attention of bidders is especially directed to the contract requirements as to the time of beginning work, the rate of progress and the times for completion of the whole of the work, and of its several parts, as required by Article VI of the contract.

Statement of Quantities: The following is a statement of the work required; the several bids will be computed, tested and canvassed by the quantities and kinds of work mentioned in this statement, viz.: Statement of quantities.

STATEMENT OF QUANTITIES

Item 1.	48-inch bronze gate-valves	1 valve
Item 2.	30-inch bronze gate-valves	2 valves
Item 3.	48-inch iron gate-valves	4 valves
Item 4.	30-inch iron gate-valves	6 valves
Item 5.	16-inch iron gate-valves	6 valves
Item 6.	16-inch steel gate-valves	4 valves
Item 7.	12-inch iron gate-valves	1 valve
Item 8.	8-inch iron gate-valves	3 valves
Item 9.	6-inch iron gate-valves	6 valves
Item 10.	4-inch iron gate-valves	9 valves
Item 11.	3-inch iron gate-valves	6 valves
Item 12.	4-inch bronze gate-valves	6 valves
Item 13.	16-inch pressure-regulating valves	8 valves
Item 14.	24-inch pressure-regulating valves	4 valves
Item 15.	Steel castings	150,000 pounds
Item 16.	Miscellaneous bronze	7,000 pounds
Item 17.	Miscellaneous iron and steel	20,000 pounds
Item 18.	Bronze billets	3,500 pounds
Item 19.	Bronze shaft-cap covers, elbows and connecting pipes	18,000 pounds

The quantities under Items 15 to 19, inclusive, may be increased or diminished by an amount not exceeding the num-

ber of pounds nearest approaching to 30 per cent. of the quantities as stated, at any time after the letting of the contract, and before 4 weeks previous to the date given in the schedule of required progress for the completion of all deliveries under such item.

Prices not changed by change of quantity.

An increase or decrease in the quantity under any of these items within the limits just given shall not be regarded as a sufficient ground for an increase or decrease in the prices, nor in the time allowed for the completion of the work except as otherwise provided in the contract.

Bidders must satisfy themselves as to actual conditions.

Bidders must satisfy themselves as to the actual conditions and requirements of the work, and shall not, at any time after the submission of a bid, assert that there was any misunderstanding in regard to the nature or amount of the work to be done.

Bidders referred to laws.

The attention of bidders is especially called to the provisions of Chapter 724 of the Laws of 1905, and acts amendatory thereof, as to the letting of contracts and payment for work, to the "Labor Law," as amended, and to the "Workmen's Compensation Law."

No bid withdrawn.

No bid from person in arrears to City.

No bid will be allowed to be withdrawn, for any reason whatever, after it has been deposited with the Board of Water Supply. No bid will be accepted from, nor contract awarded to, any person who is in arrears to the Corporation of The City of New York, upon debt or contract; nor who is in default, as surety or otherwise, upon any obligation to the Corporation of The City of New York.

Bidder's ability.

Before the award of the contract, any bidder may be required to show that he has the necessary facilities, experience, ability, and financial resources to perform the work in a satisfactory manner and within the time stipulated, and that he has had experience in work of the same nature.

Bids may be rejected.

The Board reserves the right to select the bid, the acceptance of which will, in its judgment, best secure the efficient performance of the work, or to reject any or all bids.

Bids which are incomplete, conditional or obscure, or which contain additions not called for, erasures, alterations, or irregularities of any kind may be rejected as informal. Informal bids.

CHARLES STRAUSS,
President,
CHARLES N. CHADWICK,
JOHN F. GALVIN,
Commissioners of the Board of Water Supply

Office of the Board of Water Supply,
Municipal Building, New York City

Dated, New York, June 25, 1917

BID

TO THE BOARD OF WATER SUPPLY OF THE CITY OF NEW YORK

For furnishing and delivering gate and pressure-regulating valves and appurtenances for the City tunnel of the Catskill aqueduct, in the City of New York

NOTE.—The Bidder's name and address must be inserted here, and in case of a firm, the name and address of each and every member of the firm must be added.

In case a bid shall be submitted by or in behalf of any corporation, the complete legal name and address of such corporation must be inserted here, together with the name, address and title of each and every officer of the corporation.

Made this.....day of....., 1917, by

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Bidder's declaration.

The party named above, as Bidder, declares that the only person or persons interested in this bid as principal or principals is or are named above, and that no other person than hereinabove named has any interest in this bid or in the contract proposed to be taken; that this bid is made without any connection with any other person or persons making a bid for the same purpose; that the bid is in all respects fair and without collusion or fraud, and that no member of the Board of Water Supply or of the Board of Aldermen, no head of a department, no chief of a bureau, deputy thereof, or clerk therein, nor other officer of The City of New York, nor any person in the employ of the Board of Water Supply, is, shall be or become, directly or indirectly, interested as contracting party, partner, stockholder, surety or otherwise in the performance of the contract, or in the supplies, work or business to which it relates, or in any portion of the profits thereof; that he is not in arrears to the Corporation of The City of New York, upon debt or contract, nor in default, as surety or otherwise, upon any obligation to the Corporation of The City of New York; that he has examined the form of contract and specifications approved by the Corporation Counsel, and the drawings therein referred to, and has read the Information for Bidders hereto attached; and he proposes and agrees, if this bid be accepted, that he will contract, in the form so approved, to perform all the work mentioned in said approved form of contract and specifications, and that he will accept in full payment therefor the following sums, to wit:

Intending bidder to examine contract, specifications and drawings.

Item 1. For 48-inch bronze gate-valves, the sum of.....

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.....dollars ($)
per valve.

Item 2. For 30-inch bronze gate-valves, the sum of.....

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.....dollars ($)
per valve.

Item 3. For 48-inch iron gate-valves, the sum of.....
.....
.....dollars ($)
per valve.

Item 4. For 30-inch iron gate-valves, the sum of.....
.....
.....dollars ($)
per valve.

Item 5. For 16-inch iron gate-valves, the sum of.....
.....
.....dollars ($)
per valve.

Item 6. For 16-inch steel gate-valves, the sum of.....
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.....dollars ($)
per valve.

Item 7. For 12-inch iron gate-valves, the sum of.....
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.....dollars ($)
per valve.

Item 8. For 8-inch iron gate-valves, the sum of.....
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.....dollars ($)
per valve.

Item 9. For 6-inch iron gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 10. For 4-inch iron gate-valves, the sum of.....

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.....dollars ($)
per valve.

Item 11. For 3-inch iron gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 12. For 4-inch bronze gate-valves, the sum of.....

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.....dollars ($)
per valve.

Item 13. For 16-inch pressure-regulating valves, the sum of

.....

.....dollars ($)
per valve.

Item 14. For 24-inch pressure-regulating valves, the sum of

.....

.....dollars ($)
per valve.

Item 15. For steel castings, the sum of.....

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.....dollars ($)
per pound.

Item 16. For miscellaneous bronze, the sum of.....

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.....dollars ($)
per pound.

Item 17. For miscellaneous iron and steel, the sum of....

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.....dollars ($)
per pound.

Item 18. For bronze billets, the sum of.....

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.....dollars ($)
per pound.

Item 19. For bronze shaft-cap covers, elbows and connecting pipes, the sum of.....

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.....dollars ($)
per pound.

What the prices are to cover.

The prices are to include and cover the furnishing of all the materials, the performing of all the labor requisite or proper, and the providing of all necessary machinery, tools,

apparatus and means of transportation; and the doing of all the above-mentioned work in the manner set forth, described and shown in the specifications and on the drawings for the work, and in the form of contract.

Contract to be executed in 10 days.

The Bidder further agrees to execute the contract and give the required security within 10 days from the date of the service of a written notice that said contract has been awarded to him.

Forfeiture of deposit.

If this bid shall be accepted by the Board of Water Supply, and the Bidder shall refuse or neglect, within 10 days after date of service of the written notice that the contract has been awarded to him, to execute the same, and to give the required security as hereinbefore stipulated, the deposit accompanying this bid shall be forfeited to, and retained by, The City of New York as liquidated damages for such neglect or refusal, and shall be paid into the general fund of the said City, pursuant to the provisions of Section 30 of Chapter 724 of the Laws of 1905; but if the said Bidder shall execute the contract and furnish the said security within the time aforesaid, the amount of his deposit shall be returned to him within 3 days after the execution of the contract and bonds.

NOTE.—Each and every person bidding and named above must sign here. In the case of a firm, give the first and last name of each and every member in full, with address.

In case a bid shall be submitted by or in behalf of any corporation, it must be signed in the full legal name of such corporation by some authorized officer or agent thereof, who shall also subscribe his name and office. If practicable the seal of the corporation must be affixed.

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NOTE.—The person or all persons making this bid must swear to the following affidavit, and in case of a corporation this affidavit must be made by one of its officers as an individual. If the affidavit is made out of the County of New York, a certificate must be attached showing the authority of the official before whom the affidavit was made.

State of.....,
County of.....,
} ss.:

Name(s) of Affiant(s).

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being duly sworn, say , each for himself, that the several matters in the above bid are in all respects true.

Signature(s) of Affiant(s).

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Subscribed and sworn to before me this
.....day of....., 1917

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Title

The Bidder is required to state below what work of the same character as that included in the proposed contract he has done and give references which will enable the Board to judge of his responsibility, experience, skill and business standing.

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THE CORPORATION OF THE CITY OF NEW YORK

BOARD OF WATER SUPPLY

CONTRACT

For furnishing and delivering gate and pressure-regulating valves and appurtenances for the City tunnel of the Catskill aqueduct, in the City of New York

NOTE.—The marginal notes printed on the pages of this pamphlet are intended for convenience of reference only and do not form part of the contract nor specifications.

Parties.

This agreement, made and entered into this.....

day of....., in the year one thousand nine hundred and seventeen, by and between The City of New York, acting by and through the Board of Water Supply, by virtue of the power vested in it by Chapter 724 of the Laws of 1905, of the State of New York, and the amendments

thereto, party of the first part, and.....

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hereinafter designated as the Contractor, part of the second part,

WITNESSETH, That the parties to these presents each in consideration of the undertakings, promises and agreements on the part of the other herein contained, have undertaken, promised and agreed, and do hereby undertake, promise and agree, the party of the first part for itself, its successors and assigns, Covenants.

and the part of the second part for and

heirs, executors and administrators, or successors, as follows:

ARTICLE I. Wherever the words defined in this article, or pronouns used in their stead, occur in this contract and the specifications hereto attached they shall have the meanings here given: Definitions.

The City shall mean the Corporation of The City of New York. The City.

The Board shall mean the Board of Water Supply of The City of New York, or any commission or officer duly authorized to act for The City in the execution of the work required by this contract. Board.

Commissioners shall mean the individual members of the Board of Water Supply. Commissioners.

Chief Engineer shall mean the person holding the position or acting in the capacity of Chief Engineer of the Board of Water Supply of The City of New York, or any person whom the Board may designate to act in the stead of the Chief Engineer in the case of the latter's absence or disability. Chief Engineer.

Engineer, whenever not qualified, shall mean the Chief Engineer of the Board of Water Supply of The City of New York, acting either directly or through his properly authorized agents, such agents acting severally within the scope of the particular duties entrusted to them. Engineer.

Contractor shall mean the party of the second part, above designated, entering into this contract for the performance of the work required by it, and the legal representatives of said party, or the agent appointed to act for said party in the performance of the work. Contractor.

Directed, required, permitted, etc.

Wherever in the specifications or upon the drawings the words directed, required, permitted, ordered, designated, prescribed, or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer is intended, and similarly the words approved, acceptable, satisfactory, or words of like import, shall mean approved by, or acceptable, or satisfactory to, the Engineer, subject in each case to the final determination of the Board, unless otherwise expressly stated.

In case of disability of Chief Engineer.

ART. II. Whenever the Chief Engineer aforesaid shall be unable to act in consequence of absence or other cause, then such engineer or assistant, as the Board shall designate, shall perform all the duties, and be vested with all the power herein given to the said Chief Engineer.

Engineer to give orders, explain and decide.

ART. III. The Engineer shall give all orders and directions contemplated under the contract; shall determine in all cases the amount, quality, acceptability and fitness of the work and materials which are to be paid for; shall determine all questions in relation to said work and the performance thereof, and shall decide in all cases every question which may arise relative to the fulfillment of this contract on the part of the Contractor. His certificate and decision shall be final and conclusive upon said Contractor, and in case any question shall arise between the parties hereto, touching this contract, such certificate and decision shall be a condition precedent to the right of the Contractor to receive any money under this contract. Any differences or conflicts which may arise between the Contractor and other contractors of The City in regard to their work shall be adjusted and determined by the Engineer.

Engineer to adjust differences.

Orders to foremen.

ART. IV. Whenever the Contractor is not present on the work and it may be desired to give directions, orders may be given by the Engineer, and shall be received and obeyed by the superintendent or foreman who may have charge of the particular part of the work in reference to which orders are given.

Obligations of Contractor.

ART. V. The Contractor shall do all the work and furnish all the materials, tools and appliances, except as herein otherwise specified, necessary or proper for performing and completing the work required by this contract, in the manner and

within the time hereinafter specified. All the work, labor and materials to be done and furnished under this contract shall be done and furnished strictly pursuant to, and in conformity with, the attached specifications, and the directions of the Engineer as given from time to time during the progress of the work, under the terms of this contract, and also in accordance with the contract drawings and with working drawings to be furnished from time to time, which said specifications and drawings form parts of this agreement. He shall complete the entire work to the satisfaction of the Board, and in accordance with the specifications and drawings herein mentioned, at the prices herein agreed upon and fixed therefor. The Information for Bidders hereto attached and the Bid submitted by the Contractor are also made parts of this contract.

Specifications, drawings, Information for Bidders and Bid are parts of this contract.

ART. VI. The Contractor shall commence the work embraced in this contract within 10 days after the service of a notice by the Board on him instructing him to begin work and shall complete the same in all respects within 44 consecutive weeks following the service of said notice. He shall proceed with the work at least as rapidly as required by the following schedule of deliveries:

Time for beginning and completing work.

SCHEDULE OF REQUIRED DELIVERIES

ITEM	DESCRIPTION	TIME IN WEEKS AFTER SERVICE OF NOTICE TO BEGIN WORK												
		8	16	18	20	22	24	26	28	30	32	34	36	44
1.	48-inch bronze gate-valves	..	..	..	..	..	..	..	..	..	..	..	1	..
2.	30-inch bronze gate-valves	..	..	..	..	..	..	..	..	1	..	1	..	..
3.	48-inch iron gate-valves	..	..	1	1	1	1	..	..	..	..	..	..	..
4.	30-inch iron gate-valves	..	1	1	1	1	1	1	..	..	..	..	..	..
5.	16-inch iron gate-valves	..	2	1	1	1	1	..	..	..	..	..	..	..
6.	16-inch steel gate-valves	..	..	..	2	2	..	..	..	..	..	..	..	..
7.	12-inch iron gate-valves	..	..	1	..	..	..	..	..	..	..	..	..	..
8.	8-inch iron gate-valves	3	..	..	..	..	..	..	..	..	..	..	..	..
9.	6-inch iron gate-valves	6	..	..	..	..	..	..	..	..	..	..	..	..
10.	4-inch iron gate-valves	9	..	..	..	..	..	..	..	..	..	..	..	..
11.	3-inch iron gate-valves	6	..	..	..	..	..	..	..	..	..	..	..	..
12.	4-inch bronze gate-valves	6	..	..	..	..	..	..	..	..	..	..	..	..
13.	16-inch pressure-regulating valves	..	..	2	2	..	2	..	2	..	..	..	..	..
14.	24-inch pressure-regulating valves	..	..	2	2	..	..	..	..	..	..	..	..	..
15, 16, 17, 18 and 19. From time to time as directed, but all within 44 weeks														

The rates of progress herein required have been made as low as is consistent with insuring delivery of the various materials in time for installation in conjunction with other work. Ample allowance has been made, however, for the ordinary delays incident to work of this character. No extension of time will be made for ordinary delays and accidents, and the occurrence of such will not relieve the Contractor from the necessity of maintaining this rate of progress.

In case of an extension, by the Board, of the time for the completion of this contract, as provided in Article VII, a revised schedule of progress will be made in accordance with such extension of time, if necessary.

Time important.

The time in which the various portions of this contract are to be performed and the work is to be completed is of the essence of this agreement.

Suspension of work and additional time for performance.

ART. VII. The Board reserves the right of suspending the whole or any part of the work herein contracted to be done, if it shall deem it for the interest of The City of New York so to do, without compensation to the Contractor for such suspension. If the said work shall be delayed in consequence of any act or omission of the Board (which shall be determined by the Board, and whose determination and certification thereof shall be binding and conclusive upon the Contractor), the Contractor shall be entitled to so much additional time wherein to complete the contract on his part as the Board, in its judgment, shall deem to be just; no allowance by way of damages shall be made for any of the above delays. The Board may, also, release to the Contractor the money retained and reserved under the provisions of Article XXIV, or may reduce the liability of the sureties on the bonds of the Contractor, or both, in the proportion that the amount of work done, as shown by the partial certificates, bears to the estimated amount certified by the Board to be expended under the contract. Any money released as above shall be included in the next succeeding certificate for payment.

Reduction of money retained and of bonds.

Contract and specifications may be modified by written agreement.

ART. VIII. This contract and the specifications herein contained and the drawings herein referred to, may be modified and changed from time to time as may be agreed in writing

between the parties hereto, in a manner not materially affecting the substance thereof nor materially increasing the amount to be paid, in order to carry out and complete more fully and perfectly the work herein agreed to be done and performed.

Contractor's claim for damage.

ART. IX. If the Contractor shall claim compensation for any damage sustained by reason of the acts of the Board, or its agents, he shall, within 5 days after the sustaining of such damage, make a written statement of the nature of the damage sustained, to the Engineer. On or before the fifteenth day of the month succeeding that in which any such damage shall have been sustained, the Contractor shall file with the Engineer an itemized statement of the details and amount of such damage, and, unless such statement shall be made as thus required, his claim for compensation shall be forfeited and invalidated, and he shall not be entitled to payment on account of any such damage.

Statements of damage to be filed with Engineer.

Access to work and places of manufacture.

ART. X. The Board and its engineers, inspectors, agents and other employees shall, at all times, have immediate access to all places of manufacture where apparatus and materials are being made under this contract, and shall have full facilities for determining that all such apparatus and materials are being made strictly in accordance with the specifications and drawings. The Contractor shall, whenever so requested, give the Engineer access to the proper invoices, bills of lading, etc., and shall provide scales and assistance for weighing, or assistance for measuring, any of the materials.

Information about quantities of materials.

Additional work and materials.

ART. XI. The Board may order additional work and materials as may become necessary for the proper and efficient prosecution and completion of the work under this contract, and the Contractor shall do such work and furnish such materials in accordance with such orders. No claim for such work and materials shall be made or allowed the Contractor unless the doing of such work or furnishing of such materials shall have been authorized by the Board, in writing. The aggregate amount to be paid for additional work or materials so authorized shall not exceed 5 per cent. of the amount of the contract as determined by the canvass of bids, and must be available prior to performance.

Examination of work.

ART. XII. The Engineer shall be furnished with every reasonable facility for ascertaining whether the work is in accordance with the requirements and intention of this contract, even to the extent of testing to destruction, any part or parts of finished work. Should the work thus examined prove satisfactory, the actual cost to the Contractor of testing and making good the parts examined shall be paid for; but should the work examined prove unsatisfactory, the testing, replacing and making good shall be at the expense of the Contractor.

Defective work.

ART. XIII. The inspection of the work shall not relieve the Contractor of any of his obligations to fulfill his contract as herein prescribed, and defective work shall be made good, and unsuitable materials may be rejected, notwithstanding that such work and materials have been previously overlooked by the Engineer and accepted or certified for payment. If the work, or any part thereof, shall be found defective before the final acceptance of the whole work, the Contractor shall forthwith make good such defect, without compensation, in a manner satisfactory to the Engineer, and if any materials selected for use in the work shall be condemned by the Engineer as unsuitable or not in conformity with the specifications, the Contractor shall forthwith discard such materials. If the Contractor shall fail to replace any defective work or materials after reasonable notice, the Engineer may cause such defective work or materials to be replaced and the expense thereof shall be deducted from the amount to be paid the Contractor.

Right of property in materials.

ART. XIV. Nothing in this contract shall be considered as vesting in the Contractor any right of property in materials for which certificates for payment shall have been made, but all such materials shall become the property of The City.

Laws and regulations.

ART. XV. The Contractor shall keep himself fully informed of all laws, ordinances and regulations in any manner affecting those engaged or employed in the work, or the materials used in the work, or in any way affecting the conduct of the work, and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over the same.

If any discrepancy or inconsistency should be discovered in this contract, or in the drawings or specifications herein referred to, in relation to any such law, ordinance, regulation, order, or decree, he shall forthwith report the same in writing to the Engineer. He shall at all times himself observe and comply with, and shall cause all his agents and employees to observe and comply with, all such existing and future laws, ordinances, regulations, orders and decrees; and shall protect and indemnify The City and the Board and its officers and agents against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself or by his employees. If this contract be of such a character that the employees engaged thereon are required to be insured by the provisions of Chapter 41 of the Laws of 1914 known as the "Workmen's Compensation Law" and acts amendatory thereto, the same shall be void and of no effect unless the person or corporation making or performing the same shall secure compensation for the benefit of, and keep insured during the life of this contract such employees, in compliance with the provisions of said law. Chapter 478, Laws of 1916.

ART. XVI. The Contractor shall give his personal attention constantly to the faithful prosecution of the work, and shall be present, either in person or by a duly authorized representative, continually at the place of manufacture, during its progress to receive directions or instructions from the Engineer. Copies of the contract, specifications and drawings shall be accessible at all times at the works of the Contractor. At any other point where portions of the materials for this contract may be produced, there shall be accessible at all times a copy of the specifications and drawings covering these materials. He shall not assign, transfer, convey, sublet or otherwise dispose of this contract, or his right, title or interest in or to the same or any part thereof, without the previous consent in writing of the Board indorsed herein or hereto attached; and he shall not assign, by power of attorney or otherwise, any of the moneys to become due and payable under this contract, unless by and with the like consent signified in like manner. If the Contractor shall, without such previous written consent, assign, transfer, convey, sublet, or otherwise dispose of this contract, or of his right, title or interest therein, or any of the moneys Personal attention. Access to contract, specifications and drawings. Assignment.

to become due under this contract, to any other person, company or other corporation, this contract may, at the option of the Board, be revoked and annulled, and The City shall thereupon be relieved and discharged from any and all liability and obligations growing out of the same to the Contractor, and to his assignee or transferee; provided, that nothing herein contained shall be construed to hinder, prevent, or affect an assignment by the Contractor for the benefit of his creditors, made pursuant to the statutes of the State of New York; and no right under this contract, or to any money to become due hereunder, shall be asserted against The City in law or equity, by reason of any so-called assignment of this contract, or any part thereof, or of any moneys to grow due hereunder, unless authorized as aforesaid by the written consent of the Board.

Responsibility of Contractor.

ART. XVII. The Contractor shall take all responsibility of the work, shall bear all losses resulting to him on account of the amount or character of the work, and he shall assume the defense of, and indemnify and save harmless The City and the Board and each member of the Board, and their officers and agents, from all claims of any kind arising from the performance of this contract.

Claims for infringements of patents.

ART. XVIII. The Contractor shall hold himself responsible for any claims made against The City for any infringements of patents by the use of patented articles in the performance and completion of the work, or any process connected with the work agreed to be performed under this contract or of any materials used upon the said work, and shall indemnify and save harmless The City for all costs, expenses and damages which The City shall be obliged to pay by reason of any infringement of patents used in the performance and completion of the work.

Abandonment of work.

ART. XIX. If the work to be done under this contract shall be abandoned by the Contractor, or if this contract shall be assigned, or the work sublet by him, otherwise than as herein specified, or if at any time the Engineer shall be of the opinion, and shall so certify in writing to the Board, that the performance of the contract is unnecessarily or unreasonably

delayed, or that the Contractor is wilfully violating any of the conditions or covenants of this contract, or of the specifications, or is executing the same in bad faith or not in accordance with the terms thereof, or if the different portions of the work or the entire work be not completed within the time specified in Article VI, or within the time to which the completion of the contract may be extended by the Board, the Board may notify the Contractor to discontinue all work, or any part thereof, under this contract, by a written notice to be served upon the Contractor as hereinafter provided; and thereupon the Contractor shall discontinue the work, or such part thereof, and the Board shall thereupon have the power to contract for the completion of the work in the manner prescribed by law, or to place such and so many persons as it may deem advisable, by contract or otherwise, to work, and complete the work herein described, or such part thereof, to take possession of and use any of the materials and uncompleted parts of the valves provided by the Contractor for the purposes of his work, and to procure other materials for the completion of the same, and to charge the expense of said labor and materials to the Contractor. The expense so charged shall be deducted and paid by The City out of such moneys as may be due or may at any time thereafter grow due to the Contractor under and by virtue of this contract, or any part thereof. And in case such expense shall exceed the amount which would have been payable under the contract if the same had been completed by the Contractor, he shall pay the amount of such excess to The City; and in case such expense shall be less that the amount which would have been payable under this contract if the same had been completed by the Contractor, he shall forfeit all claim to the difference; and when any particular part of the work is being carried on by the Board, by contract or otherwise, under the provisions of this article of the contract, the Contractor shall continue the remainder of the work in conformity with the terms of this contract and in such manner as in nowise to hinder or interfere with the persons or workmen employed, as above provided, by the Board, by contract or otherwise, to do any part of the work, or to complete the same under the provisions of this article of the contract.

Completion of work after abandonment.

Damages to be paid City.

ART. XX. The Contractor shall pay to The City all expenses, losses and damages, as determined by the Engineer, incurred in consequence of any defect, omission or mistake of the Contractor or his employees, or the making good thereof,

Damages for failure to complete on time.

and shall also pay for each and every day, except Sundays and legal holidays, that he shall be in default in completing the whole work to be done under this contract the sum of twenty-five dollars ($25), which sum is hereby agreed upon, not as a penalty, but as liquidated damages which The City will suffer by reason of such default. In the computation of the time actually taken to complete the whole work, the length of time (expressed in days or parts of days) during which the work or any part thereof has been delayed in consequence of any act or omission of the Board (which shall be determined by the Board, who shall certify to the same in writing, and whose determination and certificate thereof shall be binding and conclusive upon the Contractor), shall be allowed to the Contractor and excluded from said computation. The City shall have the right to deduct the amount of any such damages from any moneys due or to become due the Contractor

Extension of time.

under this contract; provided, however, that the Board shall have the right in its discretion to extend the time for the completion of each and every part of the work beyond the time stated in this contract. If the time for the completion of any part of the work as aforesaid shall be extended by the Board, then and in such case The City shall be fully authorized and empowered to deduct from the final certificate of the amount due the Contractor under the provisions of this contract, the amount of any damages determined as hereinbefore stipulated for each day that the Contractor shall be in default, for the completion of the work, beyond the date to which the time for said completion shall have been extended by the Board. (See also Article XXVI.) Permitting the Contractor to continue and finish the work, or any part of it, after the time fixed for its completion, or after the date to which the time for completion may have been extended, shall in nowise operate as a waiver on the part of The City of any of its rights under this contract.

Permission to complete contract not a waiver.

Liens.

ART. XXI. If at any time before or within 30 days after the whole work herein agreed to be performed, and all the

labor and material herein agreed to be delivered, have been performed or delivered or completed and accepted by The City, any person or persons claiming to have performed any labor or furnished any material toward the performance or completion of this contract shall file with the Board, and with the Comptroller of The City, any such notice as is described in the Lien Law, The City shall retain until the discharge thereof, from the moneys under its control, so much of such moneys as shall be sufficient to satisfy and discharge the amount in such notice claimed to be due, together with the costs of any action or actions brought to enforce such lien created by the filing of such notice.

Money may be retained.

ART. XXII. The City may keep any moneys which would otherwise be payable at any time hereunder, and apply the same, or so much as may be necessary therefor, to the payment of any expenses, losses or damages, as determined by the Engineer, incurred by The City or the Board, and may retain until all claims shall have been settled so much of such moneys as the Board shall be of the opinion will be required to settle all claims against The City and the Board and its officers and agents; and all claims for labor on the work, and also all those claims for materials for the work, notice of which, signed and sworn to by the claimants, shall have been filed in the office of the Board; or The City may make such settlements and apply thereto any moneys retained under this contract.

Prices for work.

ART. XXIII. The City will pay, and the Contractor shall receive, in full compensation for furnishing all the materials and labor, and for performing and completing all the work which is necessary or proper to be furnished or performed, in order to complete the entire work in this contract described and specified, and in said specifications and drawings described and shown, and also for all loss or damages arising out of the nature of the work aforesaid, or from any unforeseen difficulty encountered in the prosecution of the work, and for all risks of any description connected with the work, and for all expense incurred by or in consequence of the suspension or

discontinuance of the work as herein specified, the following prices, to wit:

Item 1. For 48-inch bronze gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 2. For 30-inch bronze gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 3. For 48-inch iron gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 4. For 30-inch iron gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 5. For 16-inch iron gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 6. For 16-inch steel gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 7. For 12-inch iron gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 8. For 8-inch iron gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 9. For 6-inch iron gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 10. For 4-inch iron gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 11. For 3-inch iron gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 12. For 4-inch bronze gate-valves, the sum of.....

.....

.....dollars ($)
per valve.

Item 13. For 16-inch pressure-regulating valves, the sum of

.....

.....dollars ($)
per valve.

Item 14. For 24-inch pressure-regulating valves, the sum of

.....

.....dollars ($)
per valve.

Item 15. For steel castings, the sum of.....

.....

.....dollars ($)
per pound.

Item 16. For miscellaneous bronze, the sum of.....

.....

.....dollars ($)
per pound.

Item 17. For miscellaneous iron and steel, the sum of....

.....

.....dollars ($)
per pound.

Item 18. For bronze billets, the sum of.....

.....

.....dollars ($)
per pound.

Item 19. For bronze shaft-cap covers, elbows and connecting pipes, the sum of.....

.....

.....dollars ($)
per pound.

Certificates for partial payments.

ART. XXIV. The Engineer shall make on or about the fifteenth day of the month an estimate or certificate of partial payment for 95 per cent. of the contract price for each valve and for all materials that shall have been satisfactorily delivered and accepted at the designated place of final delivery, excepting as provided in Article XXVI. The first such certificate shall include all completed valves and materials accepted at the place of final delivery since the Contractor commenced the performance of this contract on his part, and every subsequent certificate except the final certificate shall include all valves and materials accepted at the place of final delivery since the last preceding certificate was made, provided, however, that no such certificate shall be required to be made when the total value of the valves and materials delivered and accepted since the last preceding certificate amounts to less than five hundred dollars ($500). Such certificates shall be dated as of the fifteenth day of the month.

No certificate less than $500.

Partial payments.

ART. XXV. Upon each such certificate being made in writing to the Board, The City shall, within 30 days after the date of the certificate, pay to the Contractor the amount stated in such certificate; provided, however, that The City may at all times reserve and retain from said partial payments, or any of them, any sum or all sums which by the terms hereof, or of any law of the State of New York passed prior to the date hereof, it is or may be authorized to reserve or retain.

Partial payments may be withheld.

ART. XXVI. Certificates may at any time be withheld or reduced if, in the opinion of the Engineer, the work is not proceeding in accordance with this contract.

Final certificate and final payment.

ART. XXVII. Whenever, in the opinion of the Engineer, the Contractor shall have completely performed this contract on his part, the Engineer shall so certify, in writing, to the

Board, and in his certificate shall state the whole amount of work done by the Contractor, and also the value of such work under and according to the terms of this contract; and the Board shall file a certificate of the completion and acceptance of the work herein agreed to be done by the Contractor in the office of the Comptroller, signed by the Chief Engineer and the Board. On the expiration of 40 days after the acceptance by the Board of the work, The City shall pay to the Contractor, in cash, the amount remaining after deducting from the amount or value stated in the last-mentioned certificate, all such sums as shall theretofore have been paid to the Contractor under any of the provisions of this contract, and also any sum or all such sums of money as by the terms hereof The City is or may be authorized to reserve or retain; provided, that nothing herein contained shall be construed to affect the right hereby reserved of the said Board to reject the whole or any portion of the aforesaid work, should the said certificate be found, or known to be, inconsistent with the terms of this agreement, or otherwise improperly given. All prior certificates upon which partial payments may have been made shall be subject to correction in the final certificate, which final certificate may be made without notice thereof to the Contractor.

Interest in case of delay in payment.

ART. XXVIII. If the payment of the amount due the Contractor on any certificate shall be delayed through fault of The City beyond the time stipulated in Article XXV, in the case of partial payments, or Article XXVII, in the case of final payment, The City shall pay the Contractor interest on such amount at the rate of 4½ per cent. per annum for the period of such delay. The term for which interest shall be paid shall be reckoned, in the case of a partial payment, from the thirtieth day after date of the certificate to the date of payment of the certificate, and in the case of the final certificate, from the fortieth day after the acceptance of the work by the Board to the date of payment of the certificate. The date of payment of a certificate shall be considered the day on which the certificate is ready for payment, as evidenced by the records of the Comptroller's office. If interest shall become due on any certificate except the final certificate, the amount thereof, as determined by the Board, shall

be added to a succeeding certificate. If interest shall become due on the final certificate, it shall be paid on a supplementary voucher prepared by the Board and forwarded to the Comptroller for payment in the usual manner.

City not estopped by any certificate from correcting errors or recovering damages.

ART. XXIX. The City shall not, nor shall any department or officer thereof, be precluded or estopped by any return or certificate made or given by the Board, any engineer, or other officer, agent or appointee of The City under any provision of this contract, from at any time either before or after the final completion and acceptance of the work and payment therefor pursuant to any such return or certificate, showing the true and correct amount and character of the work done and materials furnished by the Contractor or any other person under this agreement, or from showing at any time that any such return or certificate is untrue and incorrect or improperly made in any particular, or that the work and materials, or any part thereof, do not in fact conform to the specifications; and The City shall not be precluded or estopped, notwithstanding any such return or certificate and payment in accordance therewith, from demanding and recovering from the Contractor such damages as it may sustain by reason of his failure to comply with the specifications.

Acceptance of work or extension of time not a waiver.

ART. XXX. Neither the acceptance of the Board or its Engineer, or any of its employees, nor any order or certificate by the Engineer, nor any order by the Board for payment of money, nor any payment for, nor acceptance of the whole or any part of the work by the Engineer or the Board, nor any extension of time, nor any possession taken by the Board or its employees, shall operate as a waiver of any portion of this contract or of any power herein reserved to the Board, or any right to damages herein provided; nor shall any waiver of any breach of this contract be held to be a waiver of any other or subsequent breach.

Final payment to terminate liability of City.

ART. XXXI. No person or corporation other than the signer of this contract as Contractor now has any interest hereunder, and no claim shall be made or be filed and neither The City nor the Board, nor any member of the Board, nor

any of its agents, shall be liable, or held to pay any money, except as provided in Articles, VII, IX, XI, XII, XVI, XIX, XXI, XXIII, XXIV, XXV, XXVII and XXVIII. The acceptance by the Contractor of the final payment aforesaid shall operate as, and shall be, a release to The City, the Board and each member of the Board and their agents, from all claim and liability to the Contractor for anything done or furnished for, or relating to, the work, or for any act or neglect of The City or of any person relating to or affecting the work, except the claim against The City for the remainder, if any there be, of the amounts kept or retained as provided in Article XXII, or interest, if any, due on the final certificate, as provided in Article XXVIII.

Contractor entitled to payment only in accordance with contract.

ART. XXXII. The Contractor shall not demand nor be entitled to receive payment for the work or materials, or any portion thereof, except in the manner set forth in this contract; nor unless each and every one of the promises, agreements, stipulations, terms and conditions herein contained to be performed, kept, observed and fulfilled on the part of the Contractor, shall have been so far forth, performed, kept, observed and fulfilled; and the Chief Engineer shall have given his certificate to that effect, and the Board shall have accepted the work. Said final certificate of completion and acceptance shall be final and conclusive upon the Contractor.

Legal address of Contractor.

ART. XXXIII. The address given in the bid upon which this contract is founded is hereby designated as the place to which all notices, letters and other communications to the Contractor shall be mailed or delivered. The delivering at the above-named place or depositing in a post-paid wrapper directed to the above place, in any post-office box regularly maintained by the post-office, of any notice, letter or other communication to the Contractor, shall be deemed sufficient service thereof upon the Contractor and the date of said service shall be the date of such delivery or mailing. Such address may be changed at any time by an instrument in writing executed and acknowledged by the Contractor and delivered to the Board. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter or other communication upon the Contractor personally.

Address may be changed.

Service upon Contractor personally.

IN WITNESS WHEREOF the Commissioners of the Board of Water Supply have hereunto set their hands on behalf of The City, and the Contractor has also hereunto set his hand; and the Board and the Contractor have executed this agreement in triplicate the day and year first above written, one part to remain with the Board, one other to be filed with the Comptroller of The City and the third to be delivered to the Contractor. Execution of contract.

THE CITY OF NEW YORK,

BY BOARD OF WATER SUPPLY,

.....
President,
.....
.....

Commissioners of the Board of Water Supply

.....
.....
.....
.....
.....
.....

Contractor

Certificate of acknowledgment of Board.

THE CITY, COUNTY AND STATE OF NEW YORK, ss.:

On the.....day of....., 1917, before me personally came.....;

on the.....day of....., 1917,

.....;

on the.....day of....., 1917,

.....;

to me known and known to me to be the Commissioners of the Board of Water Supply of The City of New York, the persons described in and who, as such Commissioners, executed the foregoing instrument, and they severally acknowledged to me that they executed the same as such Commissioners.

Dated the.....day of....., 1917

.....

.....
Title

State of New York,
County of ....., } ss.:

Certificate of acknowledgment of Contractor, if individual.

On this.....day of....., 1917, before me personally came.....

.....

to me known and known to me to be the same person described in and who executed the foregoing instrument, and he acknowledged to me that he executed the same.

.....

.....
Title

State of New York,
County of ....., } ss.:

Certificate of acknowledgment of Contractor, if a firm.

On this.....day of....., 1917, before me personally came.....

.....to me personally known and known to me to be a member of the firm of.....

....., and the person described in and who executed the foregoing instrument in behalf of said firm, and he acknowledged to me that he executed the same in behalf of, and as the act of said firm.

.....

.....
Title

Certificate of acknowledgment of Contractor, if a corporation.

State of New York, }
County of ....., } ss.:

On this .....day of....., 1917, before me personally came.....

to me personally known and known to me to be the.....

..... of .....

.....,

the corporation described in and which executed the foregoing instrument, and .....

to me personally known and known to me to be the.....

.....of said corporation, who being by me severally duly sworn did say, each for himself, as follows:

The said .....

resides at .....,

and is such.....;

and the said.....

resides at .....,

and is such.....;

I know the corporate seal of said corporation; the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation, and by the like order I signed thereto my name and official designation.

.....

.....
Title

Certificate of Contractor as to parties interested.

The party hereinbefore named as Contractor declares that the only person or persons interested as principal or principals in the bid submitted by the Contractor for this contract are named therein, and that no other person than therein named has any interest in the above-mentioned bid or in the securing of the award, and that this contract has been secured without any connection with any person or persons other than those named, and that the bid is in all respects fair and was prepared and the contract was secured without collusion or fraud, and that no member of the Board of Water Supply or the Board of Aldermen, no head of a department, no chief of a bureau, deputy thereof or clerk therein, no other officer of The City of New York nor any person in the employ of the Board of Water Supply is, or shall be, interested in the performance of the contract or in the supplies, work or business to which it relates or in any portion of the profits thereof.

.....

..... *Contractor*

.....

Certificate of acknowledgment of Contractor, if individual.

State of New York,
County of .....,
} ss.:

On this.....day of....., 1917, before me personally came.....

.....

to me known and known to me to be the same person described in and who executed the foregoing instrument, and he acknowledged to me that he executed the same.

.....

.....
Title

Certificate of acknowledgment of Contractor, if a firm.

State of New York,
County of .....,
} ss.:

On this.....day of....., 1917, before me personally came.....

.....to me personally known and known to me to be a member of the firm of.....

.....,

and the person described in and who executed the foregoing instrument in behalf of said firm, and he acknowledged to me that he executed the same in behalf of, and as the act of said firm.

.....

.....
Title

State of New York,
County of .....,
} ss.:

Certificate of acknowledgment of Contractor, if a corporation.

On this .....day of....., 1917, before me personally came.....

to me personally known and known to me to be the.....

..... of .....

.....,

the corporation described in and which executed the foregoing instrument, and .....

to me personally known and known to me to be the.....

.....of said corporation, who being by me severally duly sworn did say, each for himself, as follows:

The said .....

resides at .....,

and is such.....;

and the said.....

resides at .....,

and is such .....;

I know the corporate seal of said corporation; the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation, and by the like order I signed thereto my name and official designation.

.....

.....
Title

BONDS FOR PERFORMANCE OF CONTRACT

First bond.

KNOW ALL MEN BY THESE PRESENTS, THAT WE

.....

.....

.....as principal; and

.....

..... as surety, are held and firmly bound unto the The City of New York,

in the sum of.....

..... dollars

($.....), lawful money of the United States of America, to be paid to The City of New York, or to its certain attorney, successors or assigns, for which payment, well and truly to be made, we bind ourselves, our successors and our several and respective heirs, executors and administrators, jointly and severally, firmly by these presents.

Sealed with our seals. Dated this.....day of

....., one thousand nine hundred and seventeen.

WHEREAS, the above bounden.....

.....

.....

by an instrument in writing, bearing even date with these presents, ha contracted with The City of New York, to furnish all the materials and labor for, and in good, sufficient and workmanlike manner, furnish and deliver gate and pressure-regulating valves and appurtenances for the City tunnel of the Catskill aqueduct, in the City of New York, together with all the work incidental thereto:

Now, THEREFORE, the condition of the above obligation

is such, that if the said.....

.....

.....

shall well and truly, and in a good, sufficient and workmanlike manner, perform the said contract, and each and every provision therein contained on part to be done and performed, and complete the same in accordance with the terms and provisions therein stipulated, and in each and every respect comply with the conditions therein contained, then this obligation shall be void, otherwise it shall remain in full force and virtue.

.....[L. S.] Signatures of Contractor.

.....[L. S.]

.....[L. S.]

.....[L. S.]

.....[L. S.] Signatures of sureties or officers of surety company.

.....[L. S.]

.....[L. S.]

.....[L. S.]

.....[L. S.]

.....[L. S.]

Certificate of acknowledgment of Contractor, if individual.

State of New York,
County of ....., } ss.:

On this.....day of....., 1917, before me personally came.....

.....

to me known and known to me to be the same person described in and who executed the foregoing instrument, and he acknowledged to me that he executed the same.

.....

.....
Title

Certificate of acknowledgment of Contractor, if a firm.

State of New York,
County of ....., } ss.:

On this.....day of....., 1917, before me personally came.....

.....to me personally known and known to me to be a member of the firm of.....

....., and the person described in and who executed the foregoing instrument in behalf of said firm, and he acknowledged to me that he executed the same in behalf of, and as the act of said firm.

.....

.....
Title

State of New York, } ss.:
County of ....., }

Certificate of acknowledgment of Contractor, if a corporation.

On this.....day of ....., 1917, before me personally came.....

to me personally known and known to me to be the.....

..... of .....

.....,

the corporation described in and which executed the foregoing instrument, and .....

to me personally known and known to me to be the.....

.....of said corporation, who being by me severally duly sworn did say, each for himself, as follows:

The said .....

resides at .....,

and is such.....;

and the said.....

resides at .....,

and is such .....;

I know the corporate seal of said corporation; the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation, and by the like order I signed thereto my name and official designation.

.....

.....
Title

Attach acknowledgment and statement of surety company here.

KNOW ALL MEN BY THESE PRESENTS, THAT WE Second bond.

.....

.....

.....as principal; and

.....

.....as surety, are held and firmly bound unto The City of New York, in the sum of .....

..... dollars ($.....), lawful money of the United States of America, to be paid to The City of New York, or to its certain attorney, successors or assigns, for which payment, well and truly to be made, we bind ourselves, our successors and our several and respective heirs, executors and administrators, jointly and severally, firmly by these presents.

Sealed with our seals. Dated this.....day of

....., one thousand nine hundred and seventeen.

WHEREAS, the above bounden.....

.....

.....

by an instrument in writing, bearing even date with these presents, ha contracted with The City of New York, to furnish all the materials and labor for, and in good, sufficient and workmanlike manner, furnish and deliver gate and pressure-regulating valves and appurtenances for the City tunnel of the Catskill aqueduct, in the City of New York, together with all the work incidental thereto:

Now, THEREFORE, the condition of the above obligation

is such, that if the said.....

.....

.....

shall well and truly, and in a good, sufficient and workmanlike manner, perform the said contract, and each and every provision therein contained on part to be done and performed, and complete the same in accordance with the terms and provisions therein stipulated, and in each and every respect comply with the conditions therein contained, then this obligation shall be void, otherwise it shall remain in full force and virtue.

Signatures of Contractor.

.....[L. S.]

.....[L. S.]

.....[L. S.]

Signatures of sureties or officers of surety company.

.....[L. S.]

.....[L. S.]

.....[L. S.]

.....[L. S.]

.....[L. S.]

.....[L. S.]

.....[L. S.]

.....[L. S.]

State of New York, }
County of ....., } ss.:

Certificate of acknowledgment of Contractor, if individual.

On this.....day of....., 1917, before me personally came.....

.....

to me known and known to me to be the same person described in and who executed the foregoing instrument, and he acknowledged to me that he executed the same.

.....

.....
Title

State of New York, }
County of ....., } ss.:

Certificate of acknowledgment of Contractor, if a firm.

On this.....day of....., 1917, before me personally came.....

.....to me personally known and known to me to be a member of the firm of.....

.....,
and the person described in and who executed the foregoing instrument in behalf of said firm, and he acknowledged to me that he executed the same in behalf of, and as the act of said firm.

.....

.....
Title

Certificate of acknowledgment of Contractor, if a corporation.

State of New York,
County of ....., } ss.:

On this .....day of ....., 1917, before me personally came.....

to me personally known and known to me to be the.....

..... of .....

.....,

the corporation described in and which executed the foregoing instrument, and .....

to me personally known and known to me to be the.....

.....of said corporation, who being by me severally duly sworn did say, each for himself, as follows:

The said .....

resides at .....,

and is such.....;

and the said.....

resides at .....,

and is such .....;

I know the corporate seal of said corporation; the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation, and by the like order I signed thereto my name and official designation.

.....

.....
Title

Attach acknowledgment and statement of surety company here.

CERTIFICATE OF BOARD OF WATER SUPPLY AS TO AWARD OF CONTRACT

We, the undersigned Commissioners of the Board of Water Supply, appointed to carry out the provisions of Chapter 724 of the Laws of 1905, of the State of New York, and the amendments thereto, hereby certify that the acceptance of this contract will, in our judgment, best secure the public interests and the efficient performance of the work therein mentioned.

..... President,
.....
.....

Commissioners of the Board of Water Supply

Office of the Board of Water Supply,
Municipal Building, New York City

Dated, New York, ..., 1917

CERTIFICATE OF BOARD OF WATER SUPPLY AS TO AMOUNT TO BE EXPENDED

We, the undersigned Commissioners of the Board of Water Supply, appointed to carry out the provisions of Chapter 724 of the Laws of 1905, of the State of New York, and the amendments thereto, hereby certify that the estimated amount to be expended under the contract for furnishing and delivering gate and pressure-regulating valves and appurtenances for the City tunnel of the Catskill aqueduct, in the City of New York, to be paid out of a Fund for the New Water Supply for The City of New York, Chapter 724, Laws of 1905,

and executed with.....

.....

.....

and dated the.....day of....., 1917,

is .....

.....

.....dollars ($.....).

.....
President,
.....
.....

Commissioners of the Board of Water Supply

Dated, New York, ..., 1917

SPECIFICATIONS

NOTE.—In numbering the sections of the specifications, the decimal system is used, the figure before the decimal point indicating the item number, and the figure after the decimal point the serial number of the section under the particular item. Where several items are grouped together, as Items 1 to 12, the number of the first item of the group is placed before the decimal point, as 1.1, 1.2, 1.3, etc. The general sections have no decimal points.

GENERAL SECTIONS

Drawings.

SECTION 1. The general character and essential details of the work are shown on 21 drawings in the office of the Board, entitled "City of New York, Board of Water Supply," with various sub-titles, signed by J. Waldo Smith, Chief Engineer, and other engineers on the staff of the Board, numbered serially Contract 188, Sheets 1 to 21, inclusive; also bearing accession numbers 25611 to 25631, both inclusive, and hereinafter referred to as the contract drawings. The work shall be done in accordance with these drawings and working drawings to be furnished from time to time by the Engineer, or by the Contractor subject to the approval of the Engineer.

Drawings, lists and descriptions to be furnished by Contractor.

SECT. 2. Before proceeding with the work the Contractor shall submit for the approval of the Engineer such detailed drawings on tracing cloth as may be required. He shall also submit for approval detailed lists and descriptions of the various materials, fixtures, fittings and supplies which he proposes to use in the work. All such materials, fixtures, fittings and supplies shall be of standard first-grade quality and of the best workmanship and design. No inferior or low-grade articles will be either approved or accepted and all work of assembly and construction must be done in a first-class and workmanlike manner, it being the intent that under this contract there shall be furnished everything called for in the specifications to the end that the work when finished will result in every detail in complete valves and equipment, all in thorough and satisfactory operating condition.

Approval of Contractor's drawings not a waiver.

SECT. 3. The approval of drawings submitted under Section 2 shall not constitute a waiver of any of the requirements of this contract, nor shall The City be compelled to accept such apparatus unless it passes all tests and requirements of these specifications.

Contractor to check drawings and schedules.

SECT. 4. The Contractor is required to check all dimensions and quantities on the drawings or schedules given to him by the Engineer, and shall notify the Engineer of all errors therein which he may discover by such examination and checking. He will not be allowed to take advantage of any error or omission in these specifications nor in the drawings or schedules, as full instructions will be furnished by the Engineer should such error or omission be discovered, and the Contractor shall carry out such instructions as if originally specified.

Inspection.

SECT. 5. At all times the work shall be open to the inspection of the Engineer, and any material or workmanship which he may condemn as not conforming to the specifications shall be replaced or made satisfactory by the Contractor, even though its replacement may necessitate taking out and reinstalling the valve or other article after use by The City. Such dismantling and reinstallation shall be done by the Contractor at his expense.

Preparation for shipment.

SECT. 6. Preparation for shipment shall be as directed. The assembled parts shall not be dismantled unless so directed. Whether shipped in the assembled or dismantled state, all large parts shall be heavily skidded and protected, all small parts shall be strongly boxed, and finished surfaces shall be protected. Finished iron or steel surfaces not painted shall be slushed with approved slushing grease, or oil. No slushing material shall be used until approved. When ready for shipment each complete valve or other apparatus, or any part shipped individually, shall have plainly marked on it with paint its net weight, and each box or other package shall be plainly marked to show its contents and the item number thereof, also with its gross weight and the net weight of the contents. In addition to these weights the Contractor shall furnish net weights of all complete parts.

Engineer to order shipments.

SECT. 7. No shipment shall be made until instructions shall have been given by the Engineer; shipments shall then be made from time to time, as directed, within 3 days after service of such notification.

Iron and semi-steel castings.

SECT. 8. All iron and semi-steel castings shall be smooth, free from blow-holes, porous places, shrinkage or other cracks, and from other defects objectionable for the purpose intended. They shall be well cleaned. The quality of metal shall be such as to make strong, tough, even-grained castings satisfactory for the uses to which they will be put and for machining.

Semi-steel.

Semi-steel castings shall be made from pig iron to which there shall be added either before placing in the cupola, or during the heat, but under no conditions after the metal is drawn from the cupola, such a proportion of steel that the resulting castings will meet the requirements. Such castings shall contain not more than 0.1 per cent. sulphur, nor 0.4 per cent. phosphorus.

Test-pieces.

Test-pieces 26 inches long by 2 inches wide and 1 inch deep, cast from the same melt as the castings which they represent, when placed flatwise on supports 24 inches apart and loaded in the center, shall sustain a load of 2,200 pounds if iron, and 2,800 pounds if semi-steel, with a deflection respectively not less than 0.35 inch and 0.40 inch.

Steel castings.

SECT. 9. Steel castings shall be made by the open-hearth, or crucible process and shall be properly annealed. Steel castings shall contain not over 0.05 per cent. of either phosphorus or sulphur. The tensile strength shall be not less than 60,000 pounds per square inch, and yield point not below 27,000 pounds per square inch. Elongation shall be not less than 22 per cent., with the contraction of area not less than 30 per cent. A specimen 1 inch by ½ inch in cross-section shall bend flatwise when cold around a diameter of one inch through an angle of 120 degrees without fracture on the outside of the bent portion. Castings shall be suspended and hammered all over in the presence of the Engineer and any serious defects which appear after such treatment shall be cause for rejection. Castings shall be true to pattern and free from serious flaws or shrinkage cracks. Bearing surfaces shall be solid and no porosity will be allowed in places where the resistance and value of the casting for the purpose intended will be affected thereby.

Steel bolts and forgings.

SECT. 10. Material used for steel bolts shall be Carnegie or equal, threading stock, having an ultimate strength of from 55,000 to 75,000 pounds per square inch, an elastic limit of at least half the ultimate strength and an elongation in eight inches of not less than 20 per cent. Where not otherwise specified steel forgings shall have the following minimum physical properties: Tensile strength, 58,000 pounds per square inch; yield point, 29,000 pounds per square inch; elongation in 2 inches, 28 per cent.; reduction of area, 35 per cent. Steel shafting shall be turned.

Definition of "Bronze."

SECT. 11. Whenever the term "Bronze" is used in these specifications in a general way, or on the drawings, without qualification, it shall mean manganese or Tobin bronze.

Materials not particularly specified.

Whenever the characteristics of any bronze or other material are not particularly specified, such approved material shall be used as is customary in first-class work of the nature for which the material is employed.

Physical properties of bronze.

SECT. 12. The minimum physical properties of manganese or Tobin bronze shall be as follows:

Castings

ultimate tensile strength....65,000 pounds per square inch
yield point .....32,000 pounds per square inch
elongation ..... 25 per cent.

Forgings

ultimate tensile strength....70,000 pounds per square inch
yield point .....35,000 pounds per square inch
elongation ..... 28 per cent.

Hot rolled or extruded bronze

ultimate tensile strength....68,000 pounds per square inch
yield point .....27,000 pounds per square inch
elongation ..... 30 per cent.

After being forged into a bar, rolled, forged or extruded bronze shall stand, first, hammering hot to a fine point; second, bending cold through an angle of 120 degrees, to a radius

equal to the thickness of the bar, without showing signs of fracture.

Scleroscope test.

All forged, extruded or rolled bronze shall be subject to test with a scleroscope, and if a hardness is found materially exceeding that typical of hot-worked metal, the bronze shall be rejected or annealed promptly, as directed.

Bronze, Class C and Class D.

Bronze, Class C and Class D, shall conform to the following requirements:

Class C. Ingredients: Copper, 82.8 per cent.; tin, 4.8 per cent.; zinc, 4.4 per cent.; lead, 8 per cent. The variation in percentage of any ingredient shall not exceed one per cent. by analysis of samples from the castings.

Class D. Ingredients: Copper, 82.7 per cent.; tin, 7.1 per cent.; zinc, 5.3 per cent.; lead, 4.9 per cent. The variation in percentage of any ingredient shall not exceed one per cent. by analysis of samples from the castings.

Government bronze.

Government bronze, designated as composition G, shall be of the following composition: Copper, 87 to 89 per cent.; tin, 9 to 11 per cent.; zinc, 1 to 3 per cent.; iron, 0.06 per cent. maximum; lead, 0.2 per cent. maximum, and shall have the following minimum physical properties: Ultimate tensile strength, 30,000 pounds per square inch; yield point, 15,000 pounds per square inch; elongation, 15 per cent.

Hydraulic bronze.

Hydraulic bronze, designated as composition H, shall be of the following composition: Copper, 86 to 88 per cent.; tin, 9 to 11 per cent.; lead, 2 to 4 per cent.

Bearing bronze.

Bearing bronze, designated as composition B, shall be of the following composition: Copper, 82 to 84 per cent.; tin, 12.5 to 14.5 per cent.; zinc, 2.5 to 4.5 per cent.; iron, 0.06 per cent. maximum; lead, 1 per cent. maximum.

Bronze castings.

SECT. 13. All bronze articles shall be made of new metal, shall be free from objectionable imperfections and shall conform accurately to required dimensions. When any material is being machined or inspected, if the metal shows signs of imperfect mixing, it shall be rejected. All bronze castings, stems,

rods, bolts, tubes and plates shall be free from season cracks, surface cracks or other defects; any casting, stem, rod, bolt, tube or plate which develops any such defects within a year after delivery shall be promptly replaced in its final position at the Contractor's expense.

Standard test-pieces.

SECT. 14. Except as otherwise specified, standard test-pieces for metals shall be as follows: The standard test-pieces for measurement of tensile strength and elongation shall be 4½ inches over all, 2 inches long between shoulders; the ends shall be ¾ inch in diameter with 10 threads per inch, and the gaged portion 0.505 inch diameter. The bending bar may be a full-sized bar or a standard bar of 1 inch width and ½ inch thickness; edges may be rounded to a radius equal to one-quarter of thickness. The number of test specimens shall depend upon the character of the castings, forgings or other parts represented.

Location of test-pieces on castings.

SECT. 15. All test-pieces for steel or bronze castings shall be cut cold from coupons molded and cast on some portion of one or more castings from each melt or blow or from the sink-heads. The coupons shall be so located as to represent as accurately as feasible the quality and condition of the metal in the castings. These locations shall be as approved or directed. The coupons or sink-heads shall receive the same treatment as the castings before the test-pieces are cut therefrom, and shall be removed from the castings only in accordance with directions. For each large casting two or more test-pieces will be required.

Yield point

SECT. 16. The yield point shall be determined by careful observation of the drop of the beam or halt in the gage of the testing machine.

Tolerance in weight.

SECT. 17. No excess weight of materials more than 5 per cent. above that computed from the dimensions shown on the drawings will be paid for under items having a price by the pound. No piece under any item that weighs less than 95 per cent. of the computed weight will be accepted unless the deficiency or deficiencies be so located as, in the opinion of the Engineer, to be not seriously objectionable.

Plugging castings.

SECT. 18. Patching or plugging of iron, steel or bronze castings will not be allowed except for minor defects, and then only when and in such manner as may be approved. Welding or burning will not be allowed.

Gaskets.

SECT. 19. Unless otherwise specified, water-tight joints shall be made up with approved paper gaskets $^1/_{32}$ inch thick. All flange joints between the valves and the castings next to them shall be made with paper gaskets. Samples of paper to be used as gaskets shall be submitted to the Engineer for physical and chemical tests. Each sample of gasket shall be subjected to a chemical test and shall not show any signs of corrosive alkali or acid substances. All gaskets mentioned above or required, together with gaskets for waterway flanges, shall be furnished by the Contractor.

Stuffing-box packing.

SECT. 20. All stuffing-boxes shall be filled with an approved packing equal to samples in the office of the Engineer.

Patterns.

SECT. 21. Patterns for all parts shall be so made as to insure accuracy; skeleton patterns will be permitted. All patterns constructed under this contract shall be the property of the Contractor, but shall be maintained in suitable condition until final acceptance of the work. Patterns for the gate-valve bodies and domes and pressure-regulating valves shall be so marked that there will appear on them the letters B. W. S. N. Y. and the figures of the year when made; these shall be of such hight and raised above the surrounding surfaces such distance as may be directed. No patterns will be furnished by The City.

Machining.

SECT. 22. All machined surfaces shall conform accurately to the drawings and shall be well finished. All keys, bolts and studs shall be a good fit in their respective key-ways and holes, and all threads shall be accurately concentric. All seats shall be so machined that but little hand scraping will be needed. Great care shall be exercised in machining all parts, so as to secure accurate alinement of all moving parts and to make sure that the bores for the stems be in line with the seats when assembled. All stems shall be turned straight and true and

shall have all threads engine lathe cut, with a sufficient number of cuts to avoid straining the material. All bronze screws and bolts shall have threads engine lathe cut with a sufficient number of cuts to avoid straining the material. The operating mechanisms shall be so machined and assembled that there will be no binding nor uneven bearing of the parts. All machine work shall be absolutely first-class in quality and all surfaces wherever required shall be ground and scraped as may be necessary.

Stems, rods, bolts, plates, tubes and keys.

SECT. 23. Stems shall be forged from cast-bronze billets machined to remove imperfections. Rods shall be forged, hot rolled or extruded from cast and machined billets. All plates shall be hot rolled, except plates less than ¼ inch thick, which may be cold rolled and annealed. All bronze tubing shall be seamless-drawn, semi-annealed, made of approved commercial bronze. All bronze bolts shall be either forged from cast and machined billets, or machined from rolled or extruded rods the full size of the heads. All nuts shall be bronze. All keys shall be bronze. All bolt-heads and nuts shall be faced on the bearing surfaces and shall be U. S. standard.

No cold rolling, cold passing or cold drawing will be allowed except for plates less than ¼ inch thick and for tubing. Cold straightening shall be done by approved bending.

Test-pieces for stems, rods, bolts or plates shall be provided as directed, the number required depending upon the importance of the work.

Bolt-holes.

SECT. 24. With the exception of holes for fitted bolts, all bolt-holes for bolts one inch or more in diameter shall be drilled ⅛ inch larger than the body size of the bolt; for bolts under 1 inch and not less than ⅝ inch the holes shall be drilled $^1/_{16}$ inch larger than the body size of the bolt; for bolts under ⅝ inch and over ¼ inch in diameter the holes shall be drilled $^1/_{32}$ inch larger than body size, and for bolts ¼ inch and less in diameter the holes shall be drilled $^1/_{64}$ inch larger than body size. Holes for fitted bolts shall be drilled $^1/_{32}$ inch smaller in diameter than the bolts and reamed to size. All bolt-holes shall be faced.

Shop erection.

SECT. 25. All articles shall be completely assembled in the shop for determining the accuracy of the machine work of the various parts, for purposes of testing and for shipment. All errors thus determined shall be corrected by scraping, re-machining or by furnishing new parts as may be necessary. During this erection, all unfinished surfaces adjoining finished surfaces shall be chipped and filed, to remove projecting corners or rough edges. Parts which might be injured in shipment may be removed and boxed; such parts shall be clearly stamped or marked, so far as may be necessary to facilitate re-assembling. During shop erection and test such identification and matching numbers shall be clearly marked upon collars, pins, fitted bolts and other parts as may be required, in such manner as to facilitate re-assembling. When completely assembled all valves and parts shall be operated at least twelve times for the full length of their travel in each direction, and all defects or errors of alinement or workmanship which may be disclosed shall be corrected, as provided herein.

Match marks.

Painting.

SECT. 26. After shop erection and test, all iron or steel parts, except finished or bearing surfaces, shall be cleaned as directed and painted with two coats of P. and B., or equal, paint, as may be directed. Inaccessible parts shall be given two coats of this paint before assembling.

Serial numbers on valves.

SECT. 27. After each valve or other apparatus is completed, tested and painted, there shall be permanently fastened to it at such point as to be easily accessible for observation a bronze or brass number plate on which shall be marked the serial number given by the Engineer and the date of the shop test. This plate shall be of such size that the markings upon it can be easily read, or the number and date may be stamped into the metal.

Shipping list.

SECT. 28. Immediately after each shipment the Contractor shall furnish the Engineer a list in duplicate giving in detail the quantity included in the shipment and such description as will enable the Engineer to check the list. This list shall state the gross and net weights of each package, the destination, and the name of the consignee.

Standard weights of materials.

SECT. 29. The standard unit weights of materials shall be as follows when computed weights are to be paid for:

Manganese bronze	.302	pound per cubic inch
Compositions B, G and H	.307	" " " "
Steel	.283	" " " "
Wrought iron	.278	" " " "
Cast iron	.260	" " " "
Semi-steel	.264	" " " "

Testing and weighing in presence of Engineer. Equipment for tests.

SECT. 30. Testing of all kinds and weighing required under this contract shall, unless otherwise specifically directed, be done in the presence of the Engineer. Test heads, all bolts, piping and other appurtenances, all equipment, tools and services necessary for the various specified tests shall be furnished by the Contractor.

Weighing and measuring for payment.

SECT. 31. For Items 15 to 19, inclusive, quantities for payment shall in general be determined by weighing, but may in special cases be computed in accordance with Section 29; in either case Section 17 shall apply.

Payment for tests, bolts, gaskets, etc.

SECT. 32. The prices for each and every item of the contract shall cover and include all bolts, nuts, gaskets, packing and similar accessories required; all test-pieces, all appliances, services and costs for the various tests specified or required; and all expenses incidental to preparing the articles for shipment and delivering them, transportation charges paid, at the designated places of final delivery.

GATE-VALVES

Items 1 to 12

Work to be done.

SECT. 1.1 Under Items 1 to 12, inclusive, the Contractor shall furnish and deliver 48-inch, 30-inch, 16-inch, 12-inch, 8-inch, 6-inch, 4-inch and 3-inch iron gate-valves, 48-inch, 30-inch and 4-inch bronze gate-valves and 16-inch hydraulically operated steel valves.

Valve bodies, plugs, domes and guide shoes.

SECT. 1.2 Iron valve bodies, plugs and domes shall be cast iron, except for 4-inch and 3-inch valves, which shall have bronze plugs. Bronze bodies, plugs and domes shall be used in bronze valves. Bodies, plugs and domes of 16-inch valves, Item 6, shall be of steel. Guide shoes in bodies and domes, where used, shall be Class D bronze; guide shoes in plugs, where used, shall be Class C bronze; all guide shoes shall be finished all over, driven in place and fastened with screws of brass rivet rod; finish cuts shall be taken over the guide shoes after insertion. Satisfactory extruded channels of approved bronzes may be substituted for Classes C and D bronze shoes. 48-inch cast-iron gate-valves shall be furnished with 6-inch by-pass valves and necessary fittings. The by-pass valves shall meet the requirements of Item 9, but shall be included, together with their fittings, in Item 3.

Modifications of design.

SECT. 1.3 The designs of the bronze bonnets and bronze bodies shown on the drawings may be changed by the Contractor in any manner for the purpose of effecting a redistribution of metal as may be thought necessary for the purpose of avoiding the occurrence of cold shuts, pipes, blow-holes and other defects in the process of casting. Over-all and other essential dimensions must remain fixed and any change so made must be approved by the Engineer and must be such as to give strength at least equal to that of the designs shown on the contract drawings. Additional metal may be added at the option of the Contractor, but such addition shall not operate to increase the cost to The City, and in no event shall less metal than that shown be used.

Valve-seats.

SECT. 1.4 Valve-seats in the bodies shall be Class D bronze; valve-seats in the plugs shall be Class C bronze; both shall be thoroughly peened to fill the entire seat recesses, and fastened by screws of brass rivet rod. Seats of 8-inch, 6-inch, 4-inch and 3-inch gate-valve bodies may be screwed in and the peening omitted. Finish cuts shall be taken over these parts after insertion. Plugs of 4-inch bronze valves need not be fitted with separate seat rings.

Screw stem operating mechanisms.

SECT. 1.5 Stems shall be bronze; stem nuts shall be Class C bronze; thrust collars of the 48-inch gate-valves shall be steel, and shall bear upon bronze bearing plates fitted into the bodies of the operating mechanisms. Thrust collars of the 30-inch, 16-inch and 12-inch gate-valves shall be Class C bronze. Thrust collars of 8-inch, 6-inch, 4-inch and 3-inch gate-valves shall be the same material as the stems, and shall be forged from the solid on each stem. Thrust-bearing linings shall be bearing bronze. Bevel gears shall be semi-steel; pinions shall be steel forgings; worms shall be forged machined steel; worm wheels shall be bronze, machined to fit the worms. Contact surfaces of thrust collars and bearings shall be ground and scraped on surface plates so that the thrust from the stems will be uniformly distributed on not less than 80 per cent. of the bearing surfaces when gates are being operated. Radial oil grooves shall be provided in both thrust collars and thrust bearings of all gate-valves 30 inches and larger. All shaft and outside stem bearings shall be lined with bearing bronze bushings. Other materials shall be as indicated on the drawings. Bevel or spur gears and pinions shall be accurately cut, with all contact surfaces of teeth smooth and true to the required shape.

Water turbines.

SECT. 1.6 The 48-inch and 30-inch iron gate-valves shall be equipped with water turbines of the designs shown on the drawings. Turbine casings shall be cast iron. All bearing bushings shall be bearing bronze; guide vanes and runners shall be government bronze; shafts shall be steel; the operating valve of each turbine shall consist of a government bronze plug rotating in a bearing-bronze-lined cylinder in the turbine casing. Turbines shall be fitted with direction plates to show direction of operation. Turbine-operating handles are to be fitted with locking devices to fasten handles in neutral position only.

Indicators.

SECT. 1.7 The 48-inch and the 30-inch gate-valves and the 16-inch iron gate-valves under Item 5 shall be provided with indicators. These indicators shall show linear movement of the valves. Scales and moving parts of indicators shall be bronze. Scales shall have black electro-chemical or black nickel-plate finish and white calibrations, as directed.

Hydrostatic test.

SECT. 1.8 After completion, each valve shall be subjected to three hydrostatic tests at the pressures indicated on the drawings or in the specifications. The first and second tests shall be made with the valve closed, a test head being fastened first to one opening and then to the other; the third test shall be made with the valve open, and test heads fastened to both openings. In each case the valve shall be subjected to the test pressure for a period of 15 minutes or longer, during which time all castings, joints and seats shall be tight. Each valve shall also be operated under power and three times slightly opened while under full test pressure on sides of the disk.

Operating mechanisms for 16-inch steel valves.

SECT. 1.9 The 16-inch steel valves shall be furnished with bronze-jacketed steel stems, bronze mountings, cast-iron cylinders, cast-iron cylinder heads and cast-iron pistons. Jackets are to be pressed onto stems, after which red-lead shall be pumped under the jackets at such pressure as may be necessary to completely fill all voids. Pistons shall be fitted with hydraulic leathers. Valves and cylinders shall be tested as specified in Section 1.8 at pressures called for on the drawings and shall be tight. Pistons shall be blocked and tested with pressure on each side at a time and shall be tight. Duration of these tests shall be not less than 15 minutes each.

Turbine test.

SECT. 1.10 Each water turbine shall be subjected to an operating test apart from the valve. This test shall be for running the turbine into proper working order and for determining the suitability of workmanship. After this operation the turbine shall be used for operating the valves as specified in Sections 25 and 1.8.

Type of 3-inch and 4-inch valves.

SECT. 1.11 The 3-inch and 4-inch iron gate-valves shall be of the solid-wedge, bronze-mounted, flanged type of approved design for 200 pounds working pressure and 300 pounds test pressure.

Payment.

SECT. 1.12 For furnishing and delivering each gate-valve complete with operating mechanism or hydraulic cylinder, the Contractor shall receive the price stipulated under the appropriate item. The prices for Items 3 and 4 shall include water turbines.

PRESSURE-REGULATING VALVES

Items 13 and 14

Work to be done.

SECT. 13.1 Under Items 13 and 14, the Contractor shall furnish and deliver 16-inch and 24-inch pressure-regulating valves of the type shown on the drawings.

Materials.

SECT. 13.2 Bodies, caps and plugs shall be cast iron of rigid design. Stems shall be steel, bronze-jacketed; guides, valve-seats, cylinders and pistons shall be bronze. Valve-seat linings and piston packing shall be of best grade hydraulic leather.

Auxiliary valves and piping.

SECT. 13.3 Each pressure-regulating valve shall be fitted with two bronze auxiliary pressure regulators and two bronze gate-valves. These shall be connected to the main regulator with bronze pipe. All fittings shall be extra heavy.

Machining.

SECT. 13.4 In machining the valve bodies care shall be exercised to make the faces of the pipe flanges perpendicular to the longitudinal axis and to make the top and bottom flanges concentric with and perpendicular to the vertical axis. Guides, seats and cylinders shall be accurately concentric with the vertical axis and such machine methods shall be used as will insure this.

Assembled valves.

SECT. 13.5 When the valve caps are assembled with the bodies such scraping as may be necessary shall be done to bring all parts into alinement. Moving parts of the entire valve as assembled shall operate easily without binding. Shimming into alinement shall not be allowed. Locating dowels and fitted bolts shall be fitted after all parts are in alinement.

Identification plates.

SECT. 13.6 All pressure-regulating valves shall have attached to the inlet and outlet flanges, respectively, a substantial brass plate having stamped thereon the words INLET or OUTLET, according to the flanges to which the plates are attached.

Testing.

SECT. 13.7 Each valve body with its bonnet shall be tested after machining by stopping all openings with blank flanges

and submitting the interior to a hydrostatic pressure of 200 pounds per square inch for 15 minutes or longer, during which time all castings and joints shall be tight. Each valve shall also be tested by applying 130 pounds pressure per square inch to the up-stream side and noting the amount of leakage with the valve closed.

Range of regulation.

SECT. 13.8 Each regulating valve furnished shall be capable of maintaining a uniform pressure on the down-stream side within 5 pounds per square inch of the down-stream pressure desired. To this end, each valve shall be furnished with whatever variety of springs or diaphragms that may be necessary.

Operation.

SECT. 13.9 Pressure-regulating valves shall be guaranteed by the Contractor to perform their functions properly by regulating the flow of water at desired pressures and quantities. The City will install and try out enough of these valves to determine if they are satisfactory.

Payment.

SECT. 13.10 For furnishing and delivering each pressure-regulating valve the Contractor shall receive the price stipulated under Items 13 and 14, respectively.

STEEL CASTINGS

Item 15

Work to be done.

SECT. 15.1 Under Item 15 the Contractor shall furnish and deliver steel castings shown on the drawings, and any other miscellaneous steel castings that may be required, all machined as required.

Hydrostatic test.

SECT. 15.2 Upon completion each casting shall be subjected to the hydrostatic test pressure called for on the drawings for a period of 15 minutes or longer, during which time it shall show no signs of leakage.

Gaskets, bolts and nuts.

SECT. 15.3 Gaskets shall be furnished whenever required for flanges of steel pipe. Bronze bolts and nuts shall be paid for under Item 16. Steel bolts shall be paid for under Item 17.

Payment.

SECT. 15.4 For furnishing and delivering steel castings, the Contractor shall receive the price per pound stipulated under Item 15.

MISCELLANEOUS BRONZE

Item 16

Work to be done.

SECT. 16.1 Under Item 16 the Contractor shall furnish and deliver any bronze not required under other items, or additions to parts ordered under other items. This item may include extension stems, bolts, nuts, castings, forgings or machined parts similar to any of those shown on the contract drawings. Under this item spare parts of valves, turbines and indicators will also be ordered.

Measurement.

SECT. 16.2 The quantity to be paid for under Item 16 shall be the number of pounds delivered in accordance with drawings, specifications or orders.

Payment.

SECT. 16.3 For furnishing and delivering miscellaneous bronze, the Contractor shall receive the price per pound stipulated under Item 16.

MISCELLANEOUS IRON AND STEEL

Item 17

Work to be done.

SECT. 17.1 Under Item 17 the Contractor shall furnish and deliver any miscellaneous iron or steel parts not required under other items, or additions to parts ordered under other items. This item may include valve-box covers, hand-wheels, extension stems, bolts, castings, gears, forgings or machined parts similar to any of those shown on the contract drawings. Under this item spare parts of valves, turbines and indicators will also be ordered.

Measurement.

SECT. 17.2 The quantity to be paid for under Item 17 shall be the number of pounds delivered in accordance with drawings, specifications or orders.

Payment.

SECT. 17.3 For furnishing and delivering miscellaneous iron or steel, the Contractor shall receive the price per pound stipulated under Item 17.

BRONZE BILLETS

Item 18

Work to be done.

SECT. 18.1 Under Item 18 the Contractor shall furnish and deliver bronze billets of the sizes shown on the drawings. These billets shall be forgings turned all over to size. These billets will at some future time be machined by The City into gate stems or other parts.

Measurement.

SECT. 18.2 The quantity to be paid for under Item 18 shall be the number of pounds delivered in accordance with the drawings, specifications and orders.

Payment.

SECT. 18.3 For furnishing and delivering bronze billets the Contractor shall receive the price per pound stipulated under Item 18.

BRONZE SHAFT-CAP COVERS, ELBOWS AND CONNECTING PIPES

Item 19

Work to be done.

SECT. 19.1 Under Item 19 the Contractor shall furnish and deliver 4 bronze shaft-cap covers, 4 bronze elbows and 2 bronze connecting pipes for Shafts 13 and 18 of the City tunnel, in accordance with the drawings, specifications and requirements.

Installation.

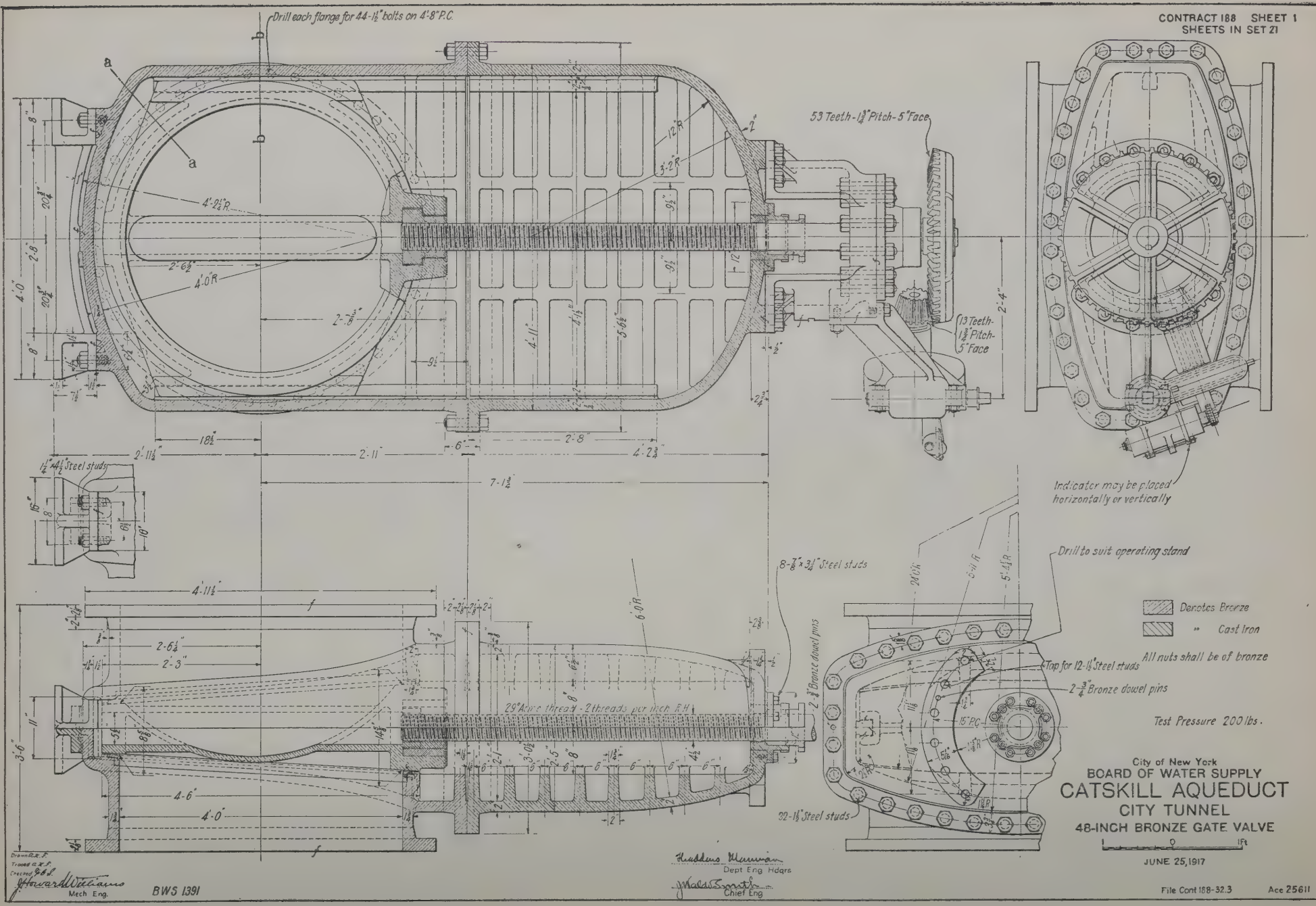
SECT. 19.2 The City will install shaft-cap covers on existing shaft caps and fit the elbows thereon. In order to insure accuracy of workmanship the Contractor shall then build in place templets of the connecting pipes. These templets shall be used in the construction of patterns. Connecting pieces shall be so made from the templets as to fit when lightly held in place before bolts are inserted, due allowance being made for gaskets. The City will install the connecting pieces. The use of "dutchmen" will not be permitted.

SECT. 19.3 All parts shall be tested in the shop by applying 200 pounds per square inch for a period of 15 minutes or longer, during which time all castings and joints shall be tight. Hydrostatic tests.

SECT. 19.4 Parts to be paid for under Item 19 shall be the number of pounds delivered in accordance with the drawings, specifications and orders. Measurement.

SECT. 19.5 For furnishing and delivering bronze shaft-cap covers, elbows and connecting pipes the Contractor shall receive the price per pound stipulated under Item 19. Payment.

CONTRACT 188 SHEET 1
SHEETS IN SET 21


Drill each flange for 44-1½" bolts on 4'-8" P.C.
53 Teeth-1¾" Pitch-5" Face
13 Teeth-1¾" Pitch-5" Face
Indicator may be placed horizontally or vertically
1¼"x4½" Steel studs
7-1¾"
29" Acme thread - 2 threads per inch R.H.
8-⅞"x3¼" Steel studs
Drill to suit operating stand
Denotes Bronze
" Cast Iron
All nuts shall be of bronze
Top for 12-1½" Steel studs
2-¾" Bronze dowel pins
Test Pressure 200 lbs.
32-1½" Steel studs

City of New York
BOARD OF WATER SUPPLY

CATSKILL AQUEDUCT
CITY TUNNEL
48-INCH BRONZE GATE VALVE

1 Ft

JUNE 25, 1917

Drawn R.K.F.
Traced R.K.F.
Checked W.B.L.
J. Howard Williams
Mech Eng.

BWS 1391

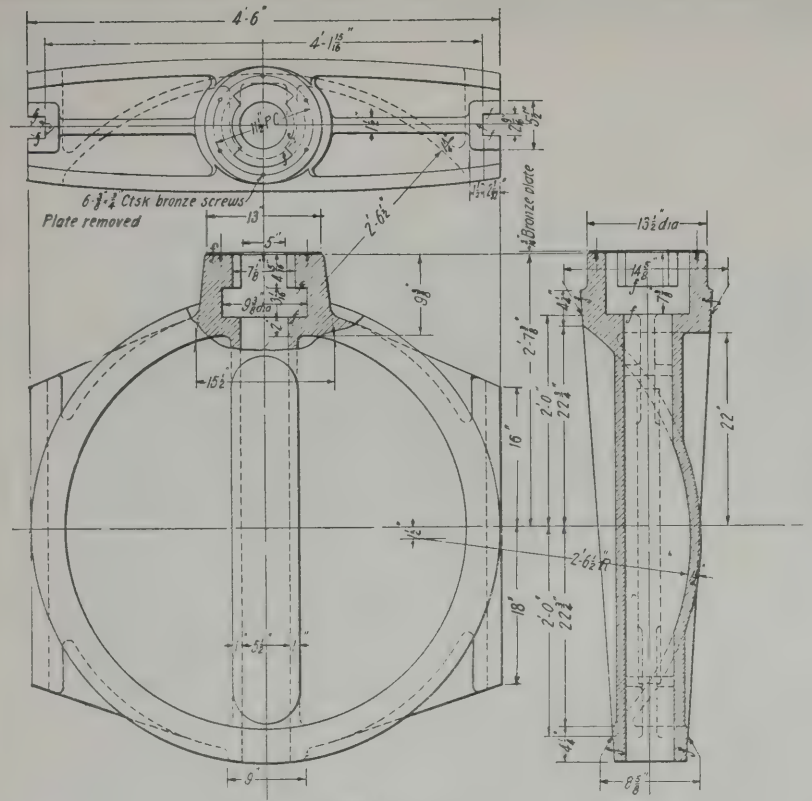
Hubbens Brennan
Dept Eng Hdqrs
J. Waldo Smith
Chief Eng

File Cont 188-32.3

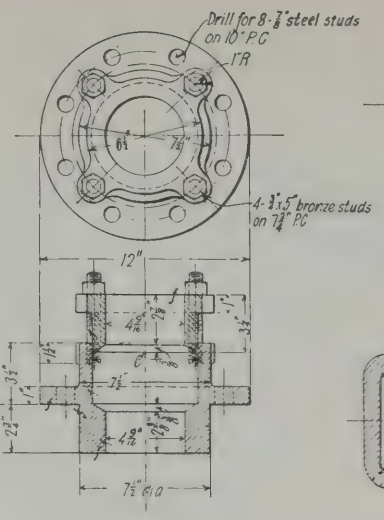
Ace 25611

Prof - Acc. 18247

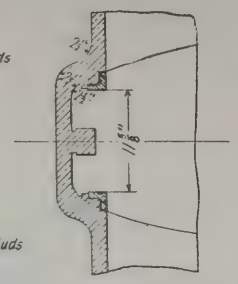
CONTRACT 188 SHEET 2
SHEETS IN SET, 21



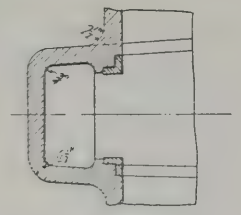
GATE



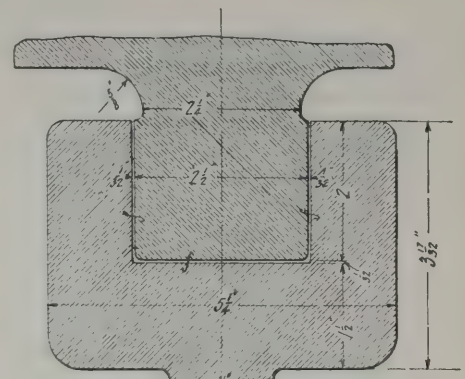
STUFFING BOX



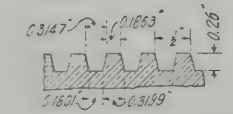
SECTION b-b



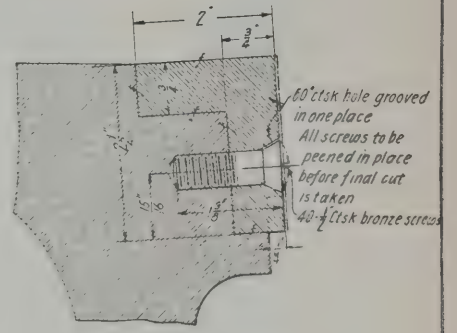
SECTION a-a



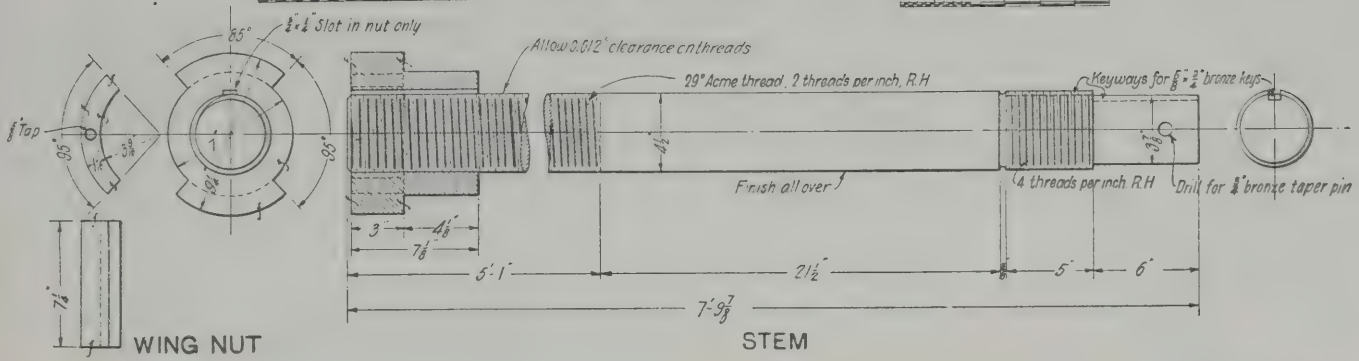
GUIDE



DETAIL OF
29° ACME THREAD



SEAT



WING NUT

STEM

All nuts shall be of bronze

Denotes Bronze

City of New York
BOARD OF WATER SUPPLY
CATSKILL AQUEDUCT
CITY TUNNEL
48-INCH BRONZE GATE VALVE
DETAILS

0 3 6 9 12 In

JUNE 25, 1917

Drawn GRF
Traced GRF
Checked BH
Edward Williams
Mech Eng

BWS 1392

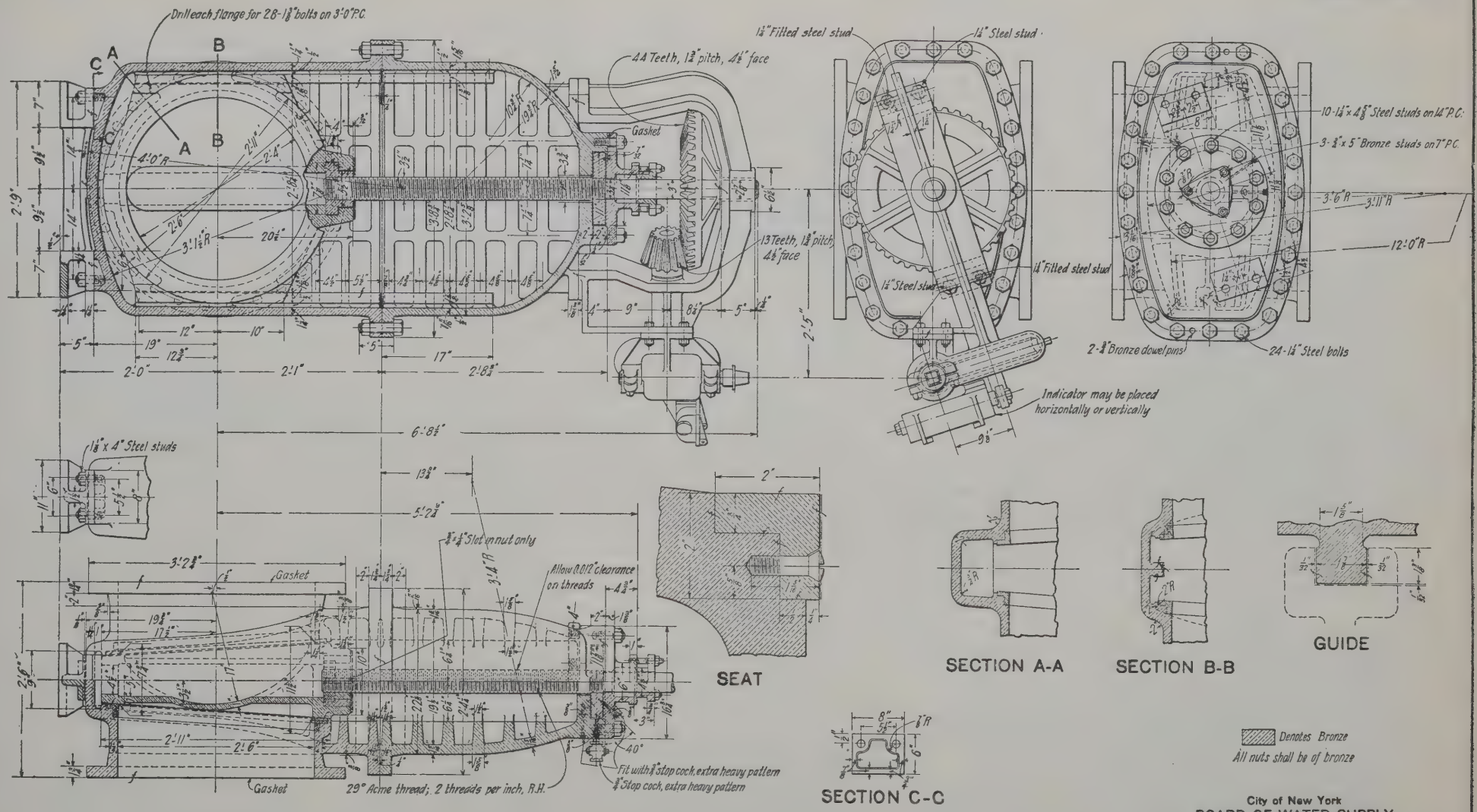
Gladdens Klemmer
Dept Eng Hdqrs
J. Waldo Smith
Chief Eng.

File Cont 188-32.3

Acc 25612

Ref - Acc 18248

CONTRACT 188 SHEET 3
SHEETS IN SET 21


Drill each flange for 28-1⅛" bolts on 3'-0" P.C.
44 Teeth, 12" pitch, 4½" face
Gasket
13 Teeth, 12" pitch, 4½" face
1½" Fitted steel stud
14" Steel stud
14" Fitted steel stud
14" Steel stud
10-1¼" x 4⅝" Steel studs on 14" P.C.
3-⅞" x 5" Bronze studs on 7" P.C.
2-⅞" Bronze dowel pins
24-1¼" Steel bolts
Indicator may be placed horizontally or vertically
1⅛" x 4" Steel studs
⅜" x ¼" Slot in nut only
Allow 0.012" clearance on threads
Gasket
Gasket
29" Acme thread; 2 threads per inch, R.H.
Fit with ¾" Stop cock, extra heavy pattern
¾" Stop cock, extra heavy pattern
SEAT
SECTION A-A
SECTION B-B
GUIDE
SECTION C-C
Denotes Bronze
All nuts shall be of bronze

City of New York
BOARD OF WATER SUPPLY

CATSKILL AQUEDUCT

CITY TUNNEL

30-INCH BRONZE GATE VALVE

0 1Ft

JUNE 25, 1917

Drawn W.J
Traced W.J
Checked F.B.E.

Howard Wiseman
Mech. Eng.

BWS 1393

Heinrich Klemm
Dept Eng Hdqrs

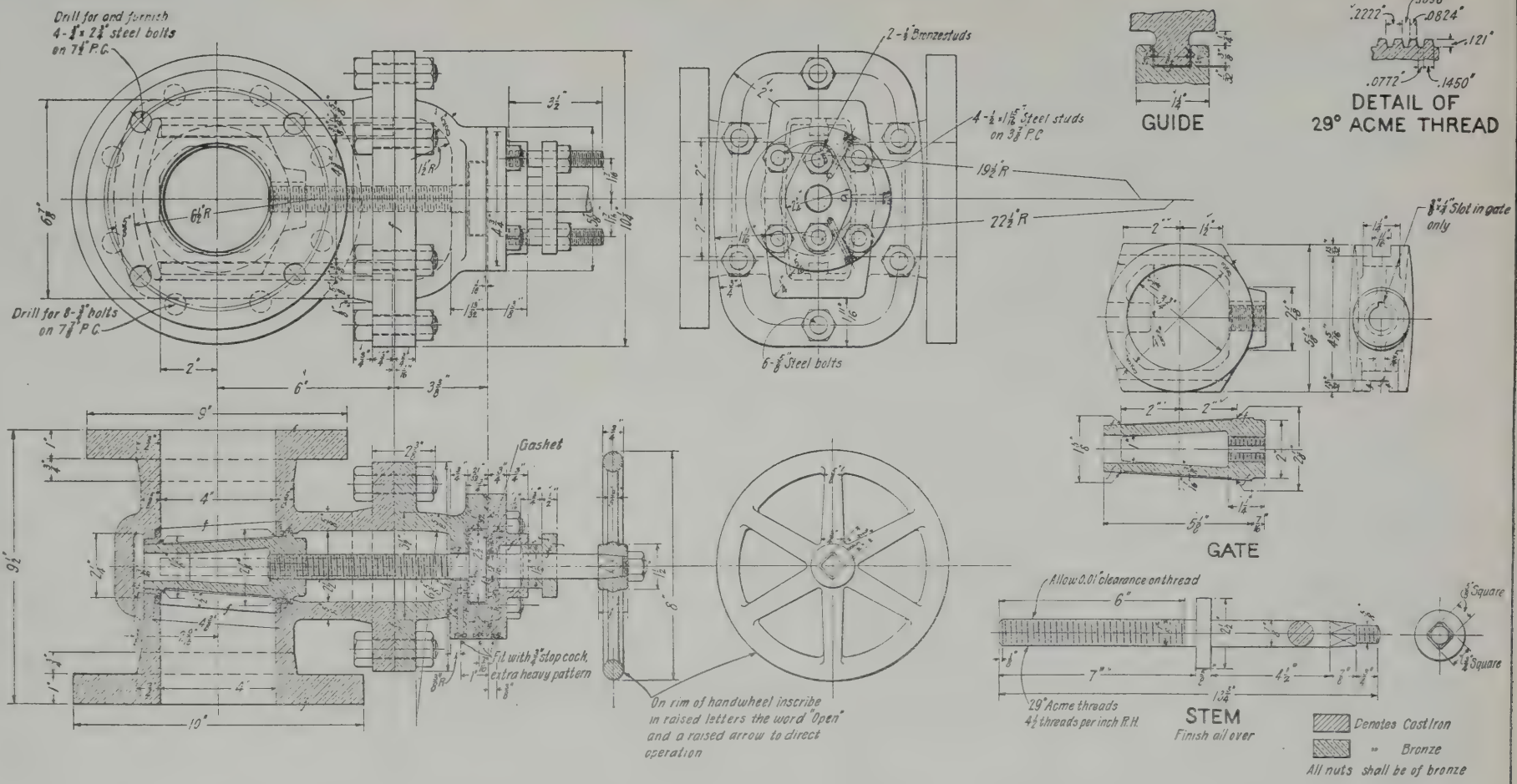
John Walker Smith
Chief Eng

File: Cont 188-32.3

Acc 25613

Ed - Acc 18281-28607

CONTRACT 188 SHEET 4
SHEETS IN SET, 21



City of New York
BOARD OF WATER SUPPLY
CATSKILL AQUEDUCT
CITY TUNNEL
4-INCH BRONZE GATE VALVE

0 1 2 3 4 5 In

JUNE 25, 1917

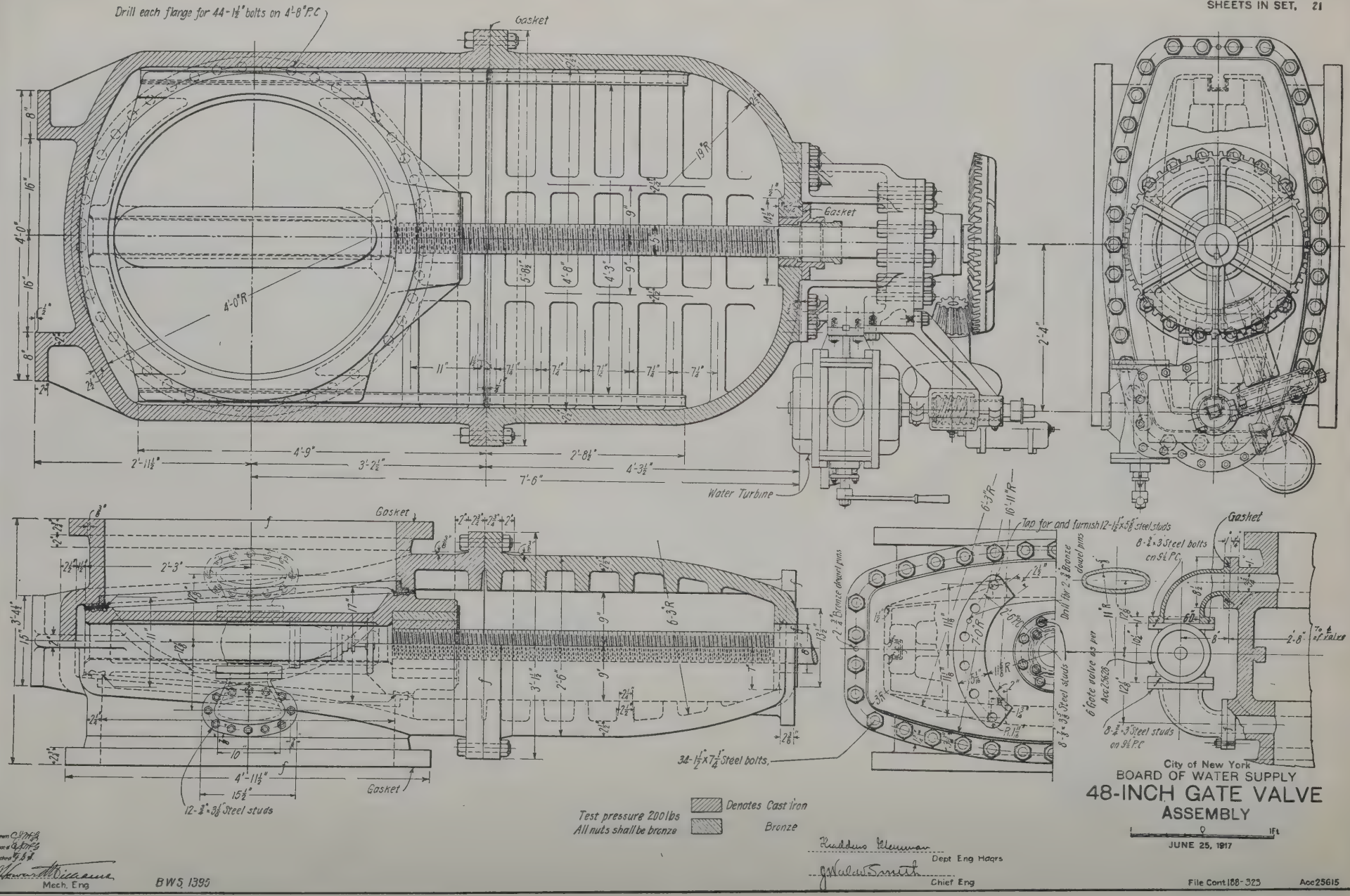
Drawn W.J.
Traced G.H.B.
Checked F.E.d'
F. Howard Williams
Mech. Eng.
BWS 1284

Thaddeus Merriman
Dept. Eng. Hdqrs
J. Waldo Smith
Chief Eng

File Cont 188-323 Acc 256:4

Ref - Acc 18390

CONTRACT 188 SHEET 5
SHEETS IN SET, 21



City of New York
BOARD OF WATER SUPPLY

48-INCH GATE VALVE ASSEMBLY

0 1 Ft

JUNE 25, 1917

Drawn C.H.T.G.
Traced C.H.T.G.
Checked W.S.H.

Mech. Eng

BWS 1395

Reddens Glenman
Dept Eng Hdqrs

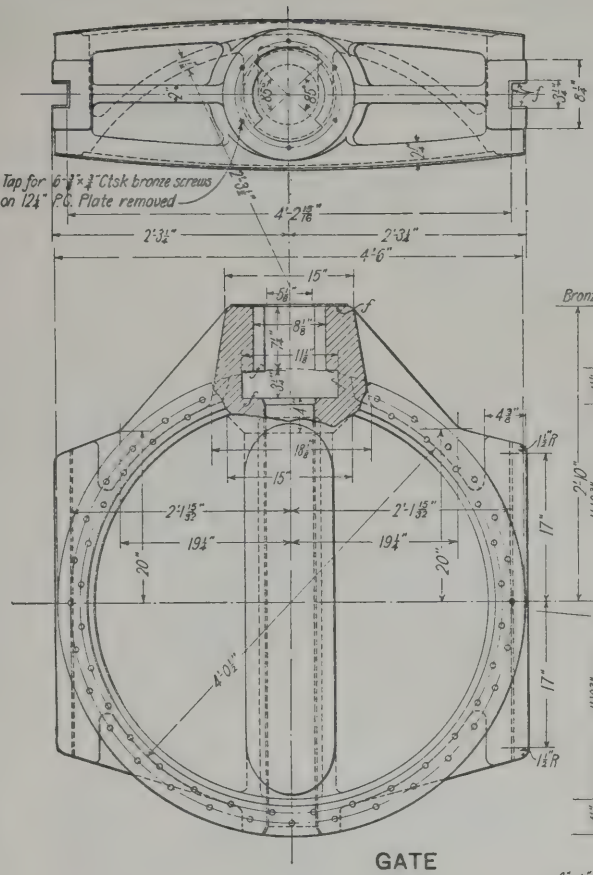
J. Waldo Smith
Chief Eng

File Cont 188-323

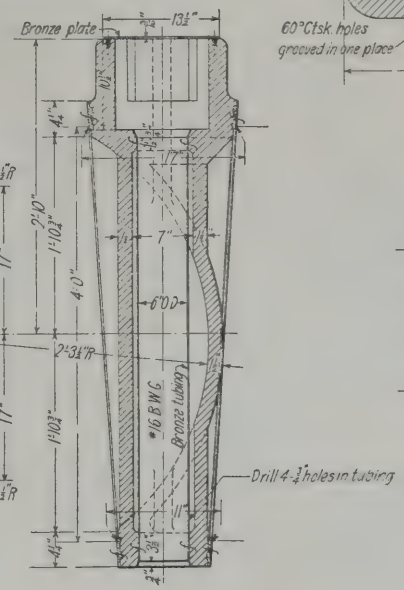
Acc 25615

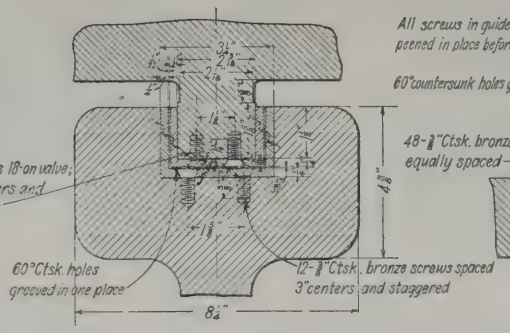
Mef-Acc 29087

CONTRACT 188 SHEET 6
SHEETS IN SET 21

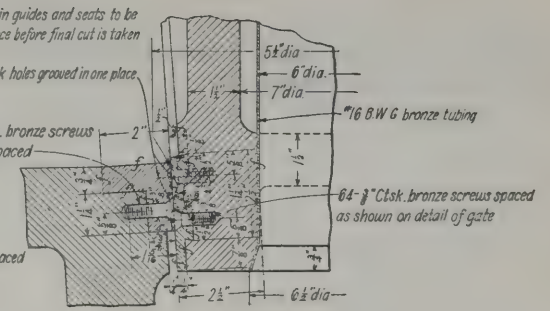


GATE



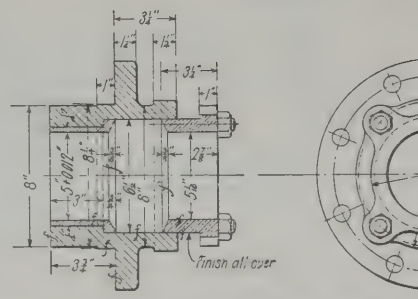

28-⅞"Ctsk. bronze screws 18 on valve, 10 on dome spaced 3" centers and staggered
60°Ctsk. holes grooved in one place
12-⅞"Ctsk. bronze screws spaced 3" centers and staggered
8¼"
4⅛"

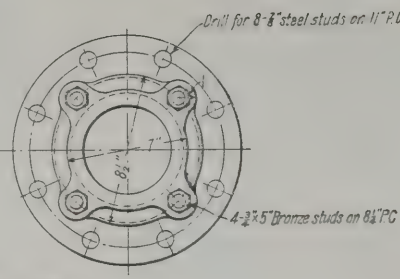
GUIDE


All screws in guides and seats to be reamed in place before final cut is taken
60°countersunk holes grooved in one place
48-⅞"Ctsk. bronze screws equally spaced
2"
5½"dia
6"dia
7"dia
#16 B.W.G bronze tubing
64-⅞"Ctsk. bronze screws spaced as shown on detail of gate
2½"
6½"dia

SEAT

0 1 2 3 4 5 In



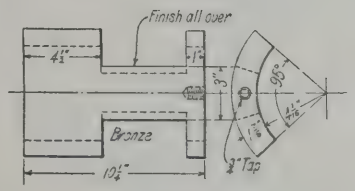


STUFFING BOX

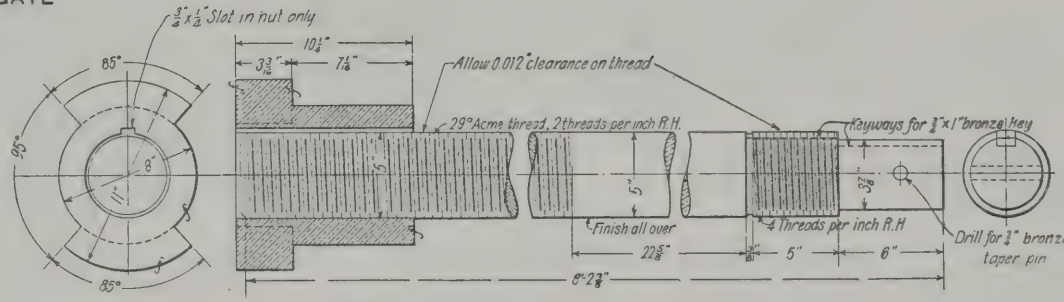
0 3 6 9 12 In

Denotes Bronze
" Cast Iron

All nuts shall be bronze



LOCKING KEY



STEM

0 3 6 9 12 In

City of New York
BOARD OF WATER SUPPLY

48-INCH GATE VALVE
DETAILS

0 1Ft

JUNE 25, 1917

Drawn C.M.C.
Traced E.P.G.
Checked F.B.S.

Mech. Eng.

BWS 1396

Dept Eng Hdqrs

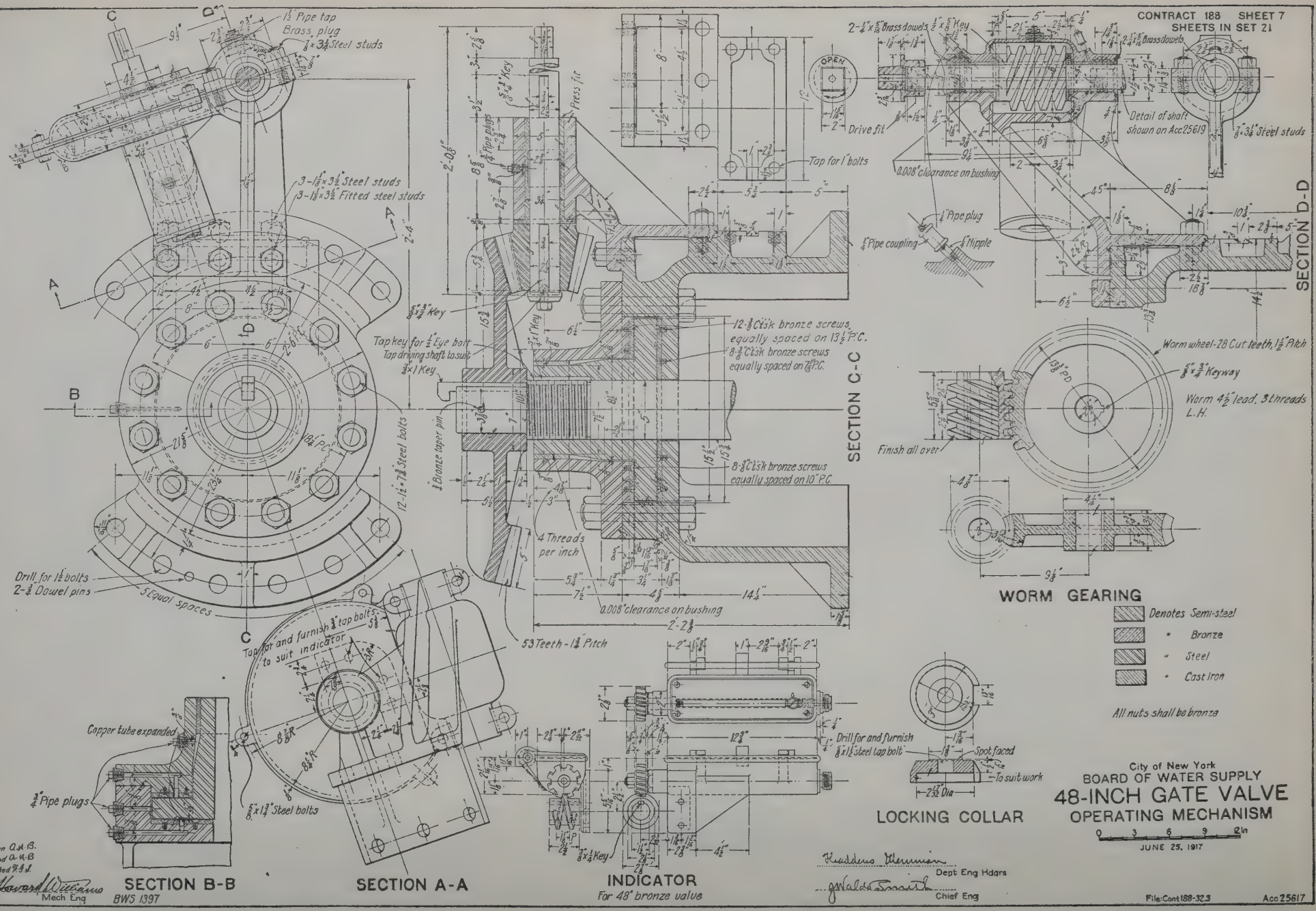
Chief Eng

File Cont 188-32.3

Acc 25616

Ref. Acc 19088

CONTRACT 188 SHEET 7
SHEETS IN SET 21



City of New York
BOARD OF WATER SUPPLY

48-INCH GATE VALVE OPERATING MECHANISM

0 3 6 9 12 In

JUNE 25, 1917

Drawn C.H.B.
Traced C.H.B.
Checked W.S.W.

J. Howard Williams
Mech Eng

Kuichling Hermann
Dept Eng Hdqrs

Walter Smith
Chief Eng

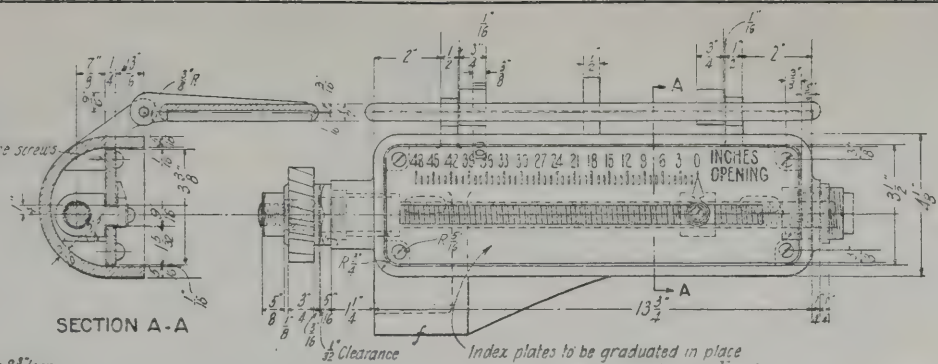
BWS 1397

File: Cont 188-32.3

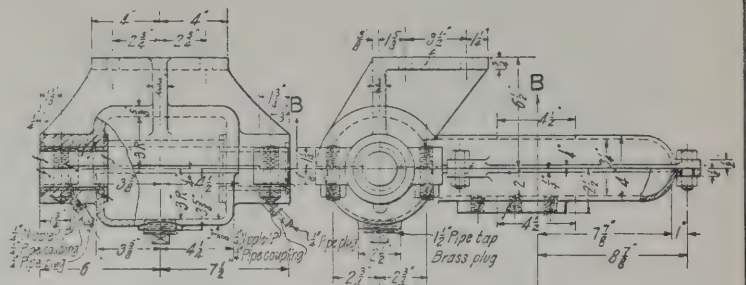
Acc 25617

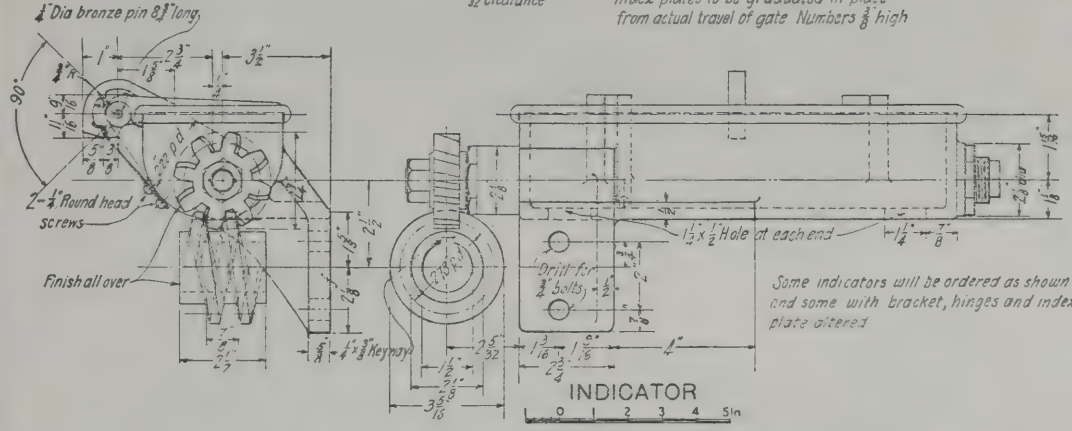
Ref-Acc 19089

CONTRACT 188 SHEET 8
SHEETS IN SET, 21

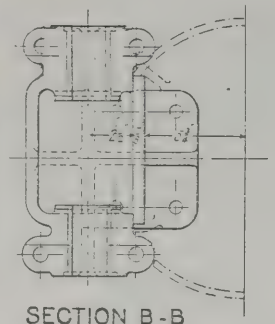

4-1¼ x ⅝ Machine screws
INCHES OPENING
A
A
Index plates to be graduated in place from actual travel of gate Numbers ⅜ high
1/32 Clearance

SECTION A-A

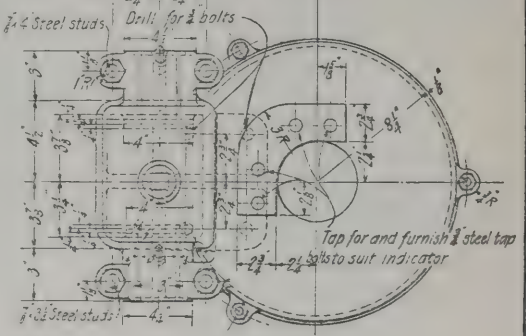


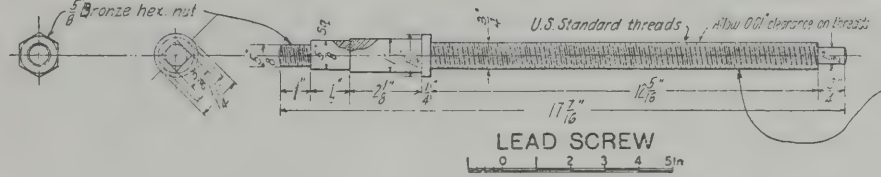

1" Dia bronze pin 8¾" long
90°
2-¼" Round head screws
Finish all over
1½ x ½ Hole at each end
Drill for ¾" bolts
¼ x ⅜ Keyway
Some indicators will be ordered as shown and some with bracket, hinges and index plate altered

INDICATOR

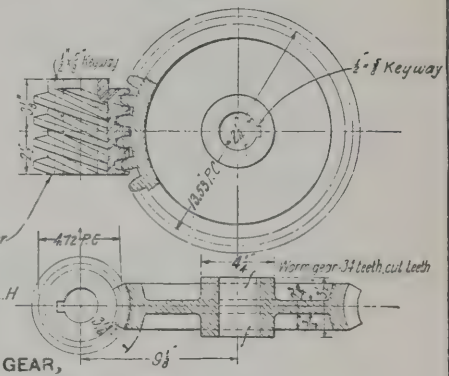


SECTION B-B
with casing removed

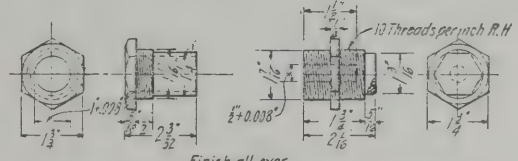



⅝ Bronze hex. nut
U.S. Standard threads
Allow .010" clearance on threads
6 Single L.H. threads per inch for 48" C.I. gate valve, 8.15" travel of index, .51" allowance for tap at closure
3 Double R.H. threads per inch for 30" C.I. gate valve, 8.45" travel of index, .18 allowance for tap at closure
These directions subject to change before material is manufactured
Indicator to be calibrated by operating valve

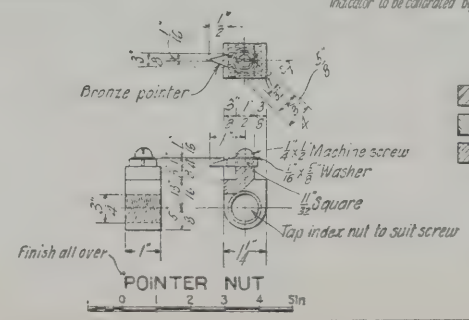
LEAD SCREW



WORM GEAR, BRACKET AND CASING



BEARING END BEARING



POINTER NUT

Denotes Steel
" Bronze
" Cast Iron
All nuts shall be bronze

Drawn C.J.M.G.
Traced C.J.M.G.
Checked A.C.E.

Howard A. Williams
Mech. Eng.

BWS 1998

Reddington Tileman Dept. Eng. Hdqrs.

J. Waldo Smith Chief Eng.

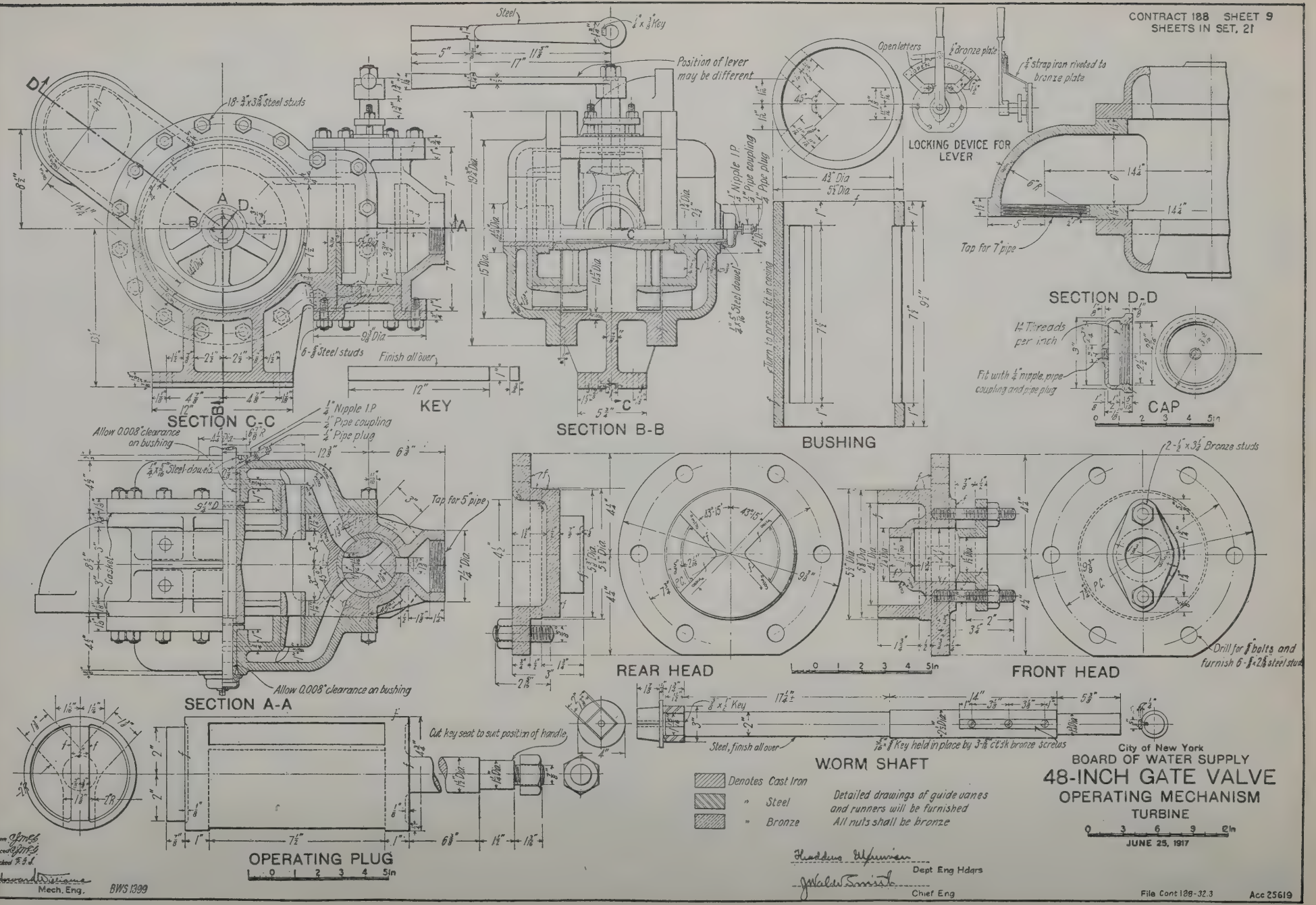
City of New York
BOARD OF WATER SUPPLY
48-INCH AND 30-INCH GATE VALVES
INDICATOR AND OPERATING GEAR

JUNE 25, 1917

File: Cont 188 32.3 Acc 25618

Ref - Acc 19095

CONTRACT 188 SHEET 9
SHEETS IN SET, 21



City of New York
BOARD OF WATER SUPPLY

48-INCH GATE VALVE
OPERATING MECHANISM
TURBINE

JUNE 25, 1917

Drawn [illegible]
Traced [illegible]
Checked [illegible]

[signature] Mech. Eng.

BWS 1399

[signature] Dept Eng Hdqrs

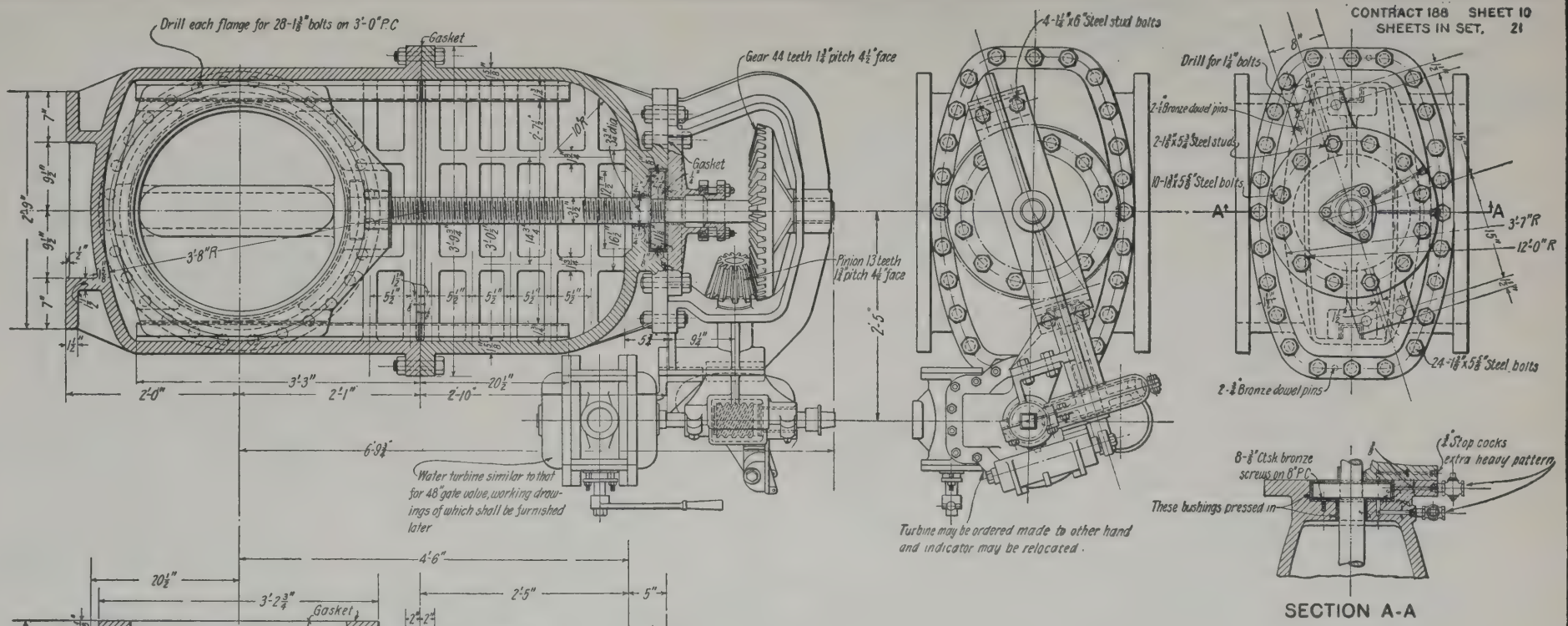
[signature] Chief Eng

File Cont 188-32.3

Acc 25619

Ref - Acc 19030, 19449

CONTRACT 188 SHEET 10
SHEETS IN SET. 21


Drill each flange for 28-1⅛" bolts on 3'-0" P.C.
Gasket
Gear 44 teeth 1¼" pitch 4½" face
Gasket
Pinion 13 teeth 1¼" pitch 4½" face
Water turbine similar to that for 48" gate valve, working drawings of which shall be furnished later
Turbine may be ordered made to other hand and indicator may be relocated.
4-1¼" x 6" Steel stud bolts
Drill for 1¼" bolts
2-1" Bronze dowel pins
2-1⅛" x 5¾" Steel studs
10-1⅛" x 5⅝" Steel bolts
24-1⅛" x 5⅝" Steel bolts
2-1" Bronze dowel pins
8-⅞" Ctsk bronze screws on 8" P.C.
These bushings pressed in
1" Stop cocks extra heavy pattern
SECTION A-A
Gasket
Bronze
29° Acme thread 2 per inch R.H.
Gasket
Denotes Cast Iron
" Bronze
All nuts shall be bronze
Test pressure 200 lbs

City of New York
BOARD OF WATER SUPPLY
30-INCH GATE VALVE
ASSEMBLY

0 1ft.

JUNE 25, 1917

Drawn A. R. F.
Traced J.H.L.
Checked R.C.E.

Warren H. Williams
Mech Eng

BWS 1400

Frederic Newman
Dept Eng Hdqrs

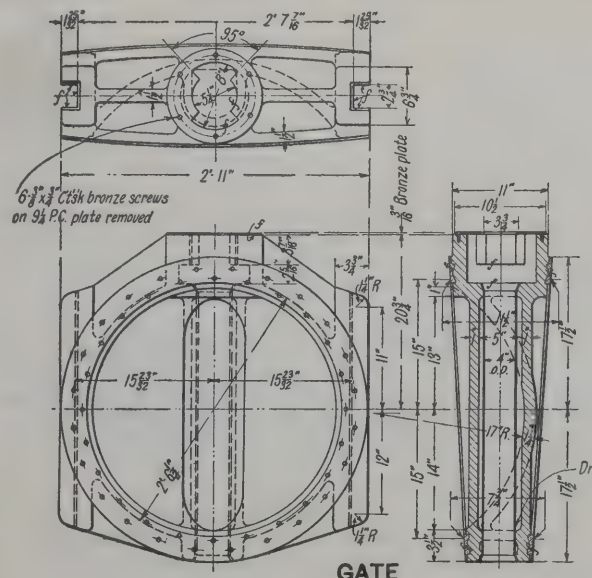
J. Waldo Smith
Chief Eng

File Cont 188-32.3

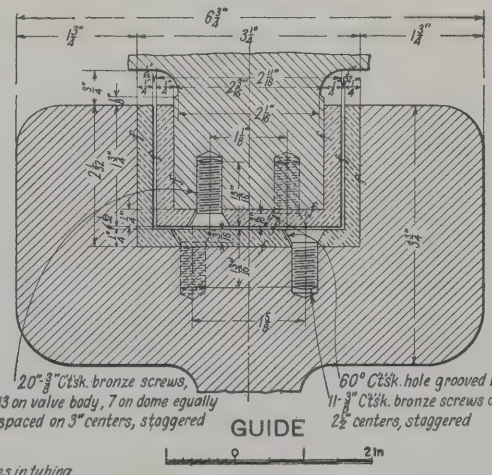
Acc 25620

Ref - Acc 19033

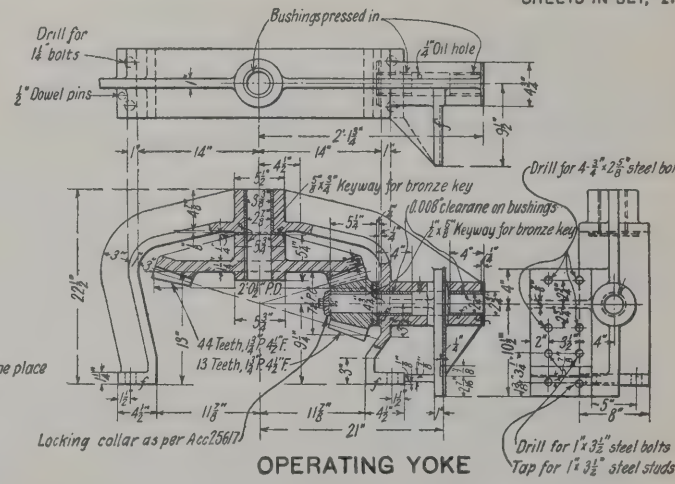
CONTRACT 188 SHEET 11
SHEETS IN SET, 21



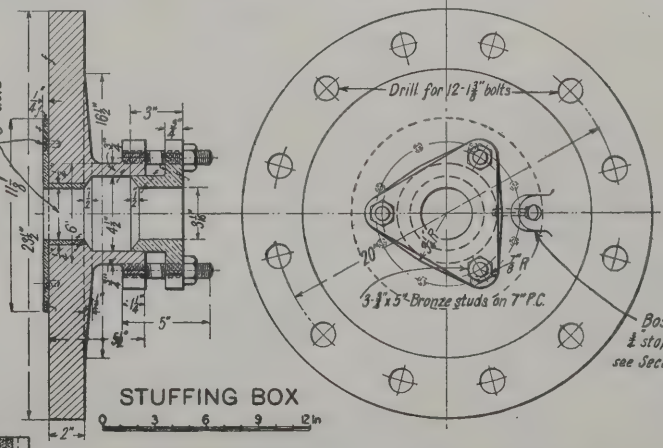
GATE


20-⅜" C'tsk. bronze screws, 13 on valve body, 7 on dome equally spaced on 3" centers, staggered
60° C'tsk. hole grooved in one place
11-⅜" C'tsk. bronze screws on 2½" centers, staggered
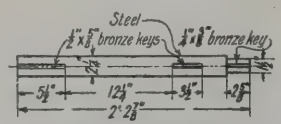
GUIDE


Drill for 1¼" bolts
Bushings pressed in
¼" Oil hole
½" Dowel pins
Drill for 4-¾" x 2⅝" steel bolts
⅝" x ⅜" Keyway for bronze key
0.006" clearance on bushings
¾" x ⅜" Keyway for bronze key
44 Teeth, 13/14 P, 4½° F.
13 Teeth, 14/15 P, 4½° F.
Locking collar as per Acc 25617
Drill for 1" x 3½" steel bolts
Tap for 1" x 3½" steel studs

OPERATING YOKE



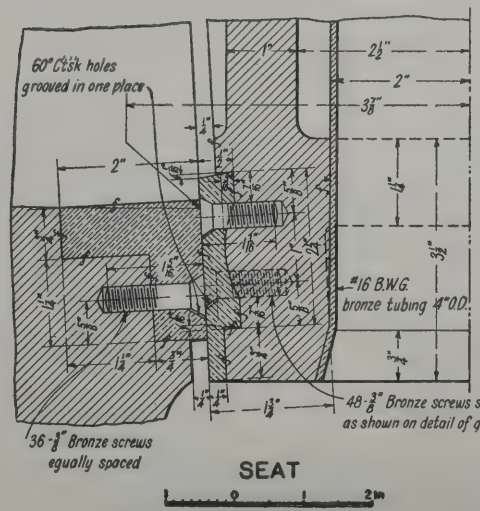
STUFFING BOX



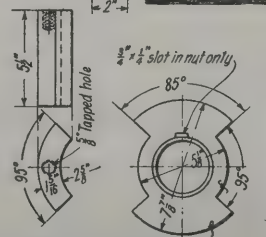
PINION SHAFT
Finish all over

Denotes Cast Iron
" Steel
" Bronze

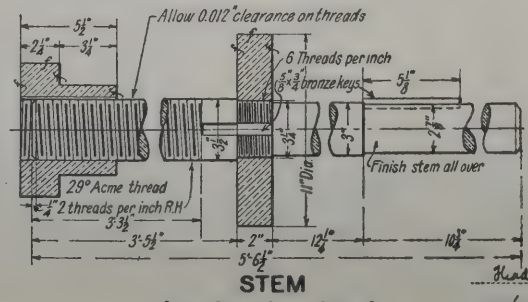
All nuts shall be bronze


60° C'tsk holes grooved in one place
#16 B.W.G. bronze tubing 4" O.D.
48-⅜" Bronze screws spaced as shown on detail of gate
36-⅞" Bronze screws equally spaced

SEAT



WING NUT AND KEY


Allow 0.012" clearance on threads
6 Threads per inch
⅝" x ⅜" bronze keys
Finish stem all over
2-9° Acme thread
2 threads per inch R.H.

STEM

City of New York
BOARD OF WATER SUPPLY

30-INCH GATE VALVE
DETAILS

JUNE 25, 1917

Drawn A.N.E.
Traced 22K
Checked F.C.E.

Mech Eng

BWS 1401

Depl Eng Hdqrs

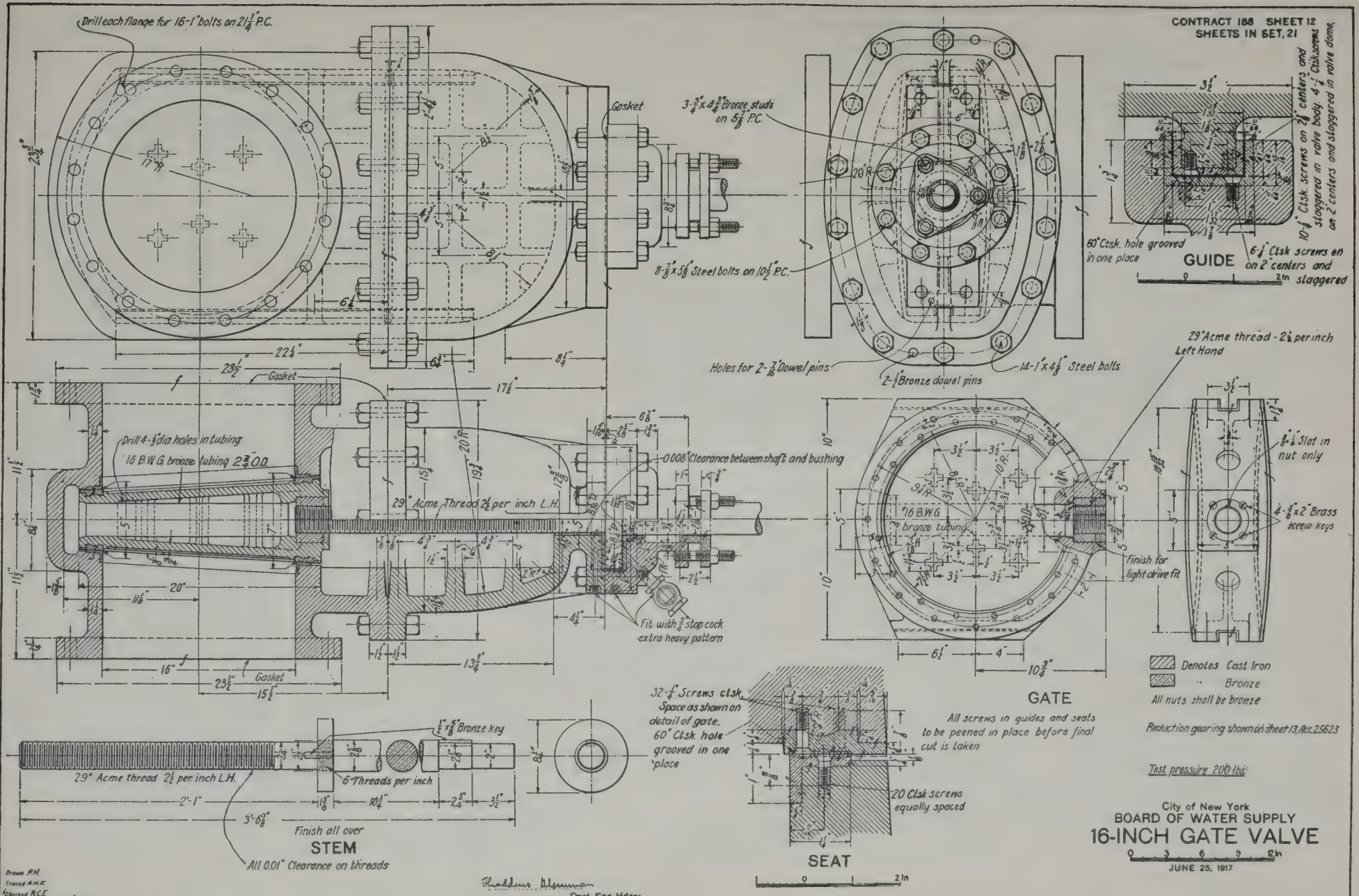
Chief Eng

File Cont 188-32.3

Acc 25621

Ref - Acc 19094

CONTRACT 188 SHEET 12
SHEETS IN SET, 21


Drill each flange for 16-1" bolts on 21¼" P.C.
Gasket
3-3⅞" x 4⅜" Bronze studs on 5⅞" P.C.
8-⅞" x 5⅛" Steel bolts on 10½" P.C.
Holes for 2-⅞" Dowel pins
2-½" Bronze dowel pins
14-1" x 4⅛" Steel bolts
60° Ctsk. hole grooved in one place
GUIDE
6-¼" Ctsk screws on 2" centers and staggered
10-¼" Ctsk. screws on 2½" centers and staggered in valve body, 4-¼" Ctsk screws on 2" centers and staggered in valve dome.
Drill 4-½" dia holes in tubing
16 B.W.G. bronze tubing 2¾" O.D.
0.008" Clearance between shaft and bushing
29° Acme Thread 2½ per inch L.H.
Fit with ¾" stop cock extra heavy pattern
29° Acme thread - 2½ per inch Left Hand
16 B.W.G. bronze tubing
Finish for light drive fit
¾" Slot in nut only
4-⅝" x 2" Brass screw keys
Denotes Cast Iron
" " Bronze
All nuts shall be bronze
GATE
All screws in guides and seats to be peened in place before final cut is taken
32-¼" Screws ctsk. Space as shown on detail of gate. 60° Ctsk. hole grooved in one place
20 Ctsk screws equally spaced
SEAT
½" x ⅝" Bronze key
29° Acme thread 2½ per inch L.H.
6 Threads per inch
Finish all over
STEM
All 0.01" Clearance on threads

Reduction gearing shown on sheet 13, Acc. 25623

Test pressure 200 lbs.

City of New York
BOARD OF WATER SUPPLY
16-INCH GATE VALVE
0 3 6 9 12in
JUNE 25, 1917

Drawn P.H.
Traced A.K.K.
Checked R.C.E.

Howard Williams
Mech Eng

BWS 1402

Ref Acc 19096

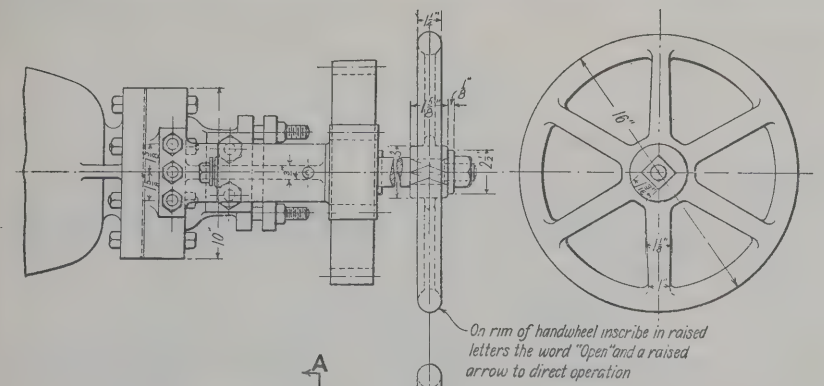
Haddens Newman
Dept Eng Hdqrs

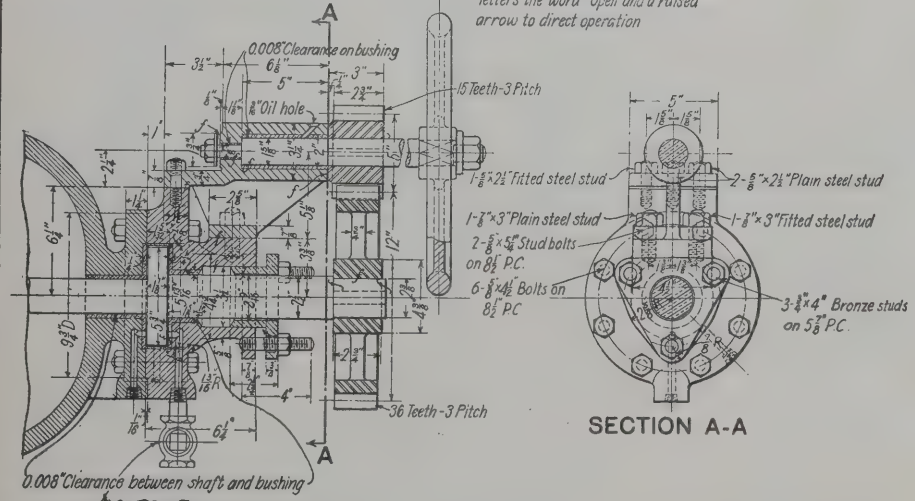
Gerald Smith
Chief Eng

File Cont 188 - 32.3

Acc 25622

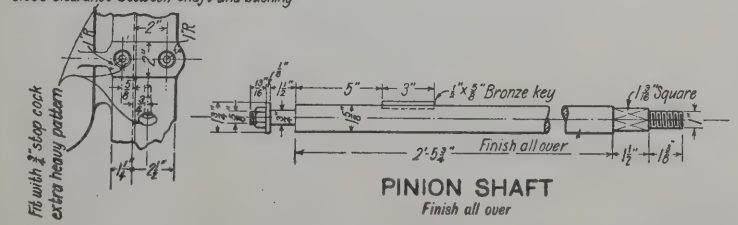
CONTRACT 188 SHEET 13
SHEETS IN SET, 21



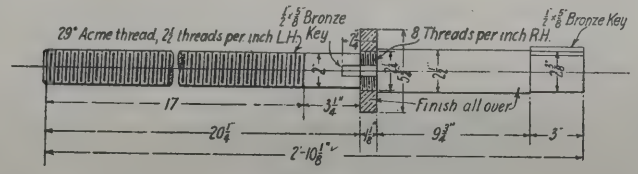


1-⅞"×2¼" Fitted steel stud
1-⅞"×3" Plain steel stud
2-⅝"×5⅝" Stud bolts on 8½" P.C.
6-⅞"×4½" Bolts on 8½" P.C.
2-⅝"×2¼" Plain steel stud
1-⅞"×3" Fitted steel stud
3-¾"×4" Bronze studs on 5⅞" P.C.

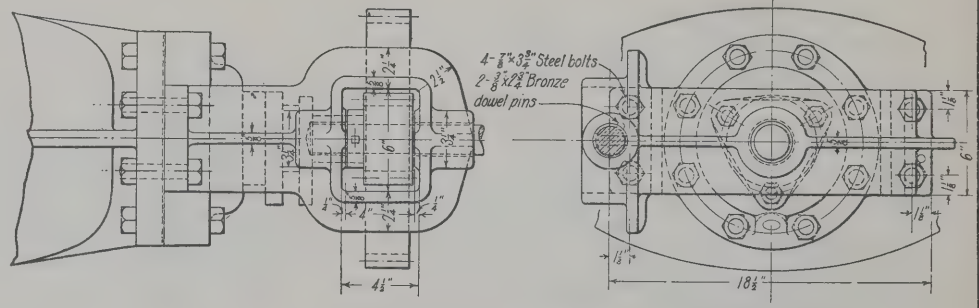
SECTION A-A



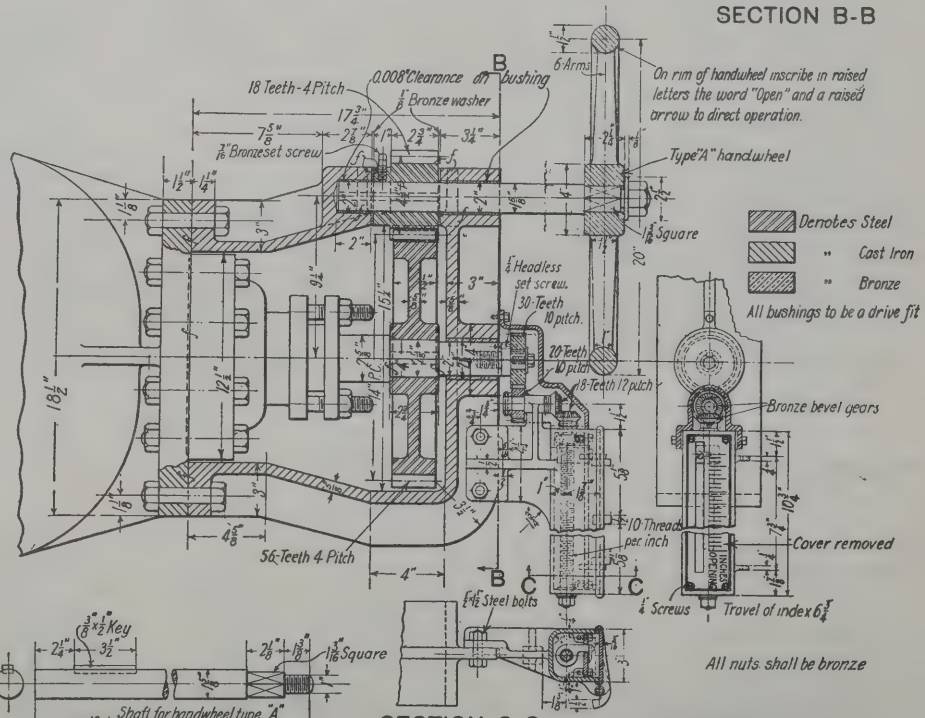
PINION SHAFT
Finish all over



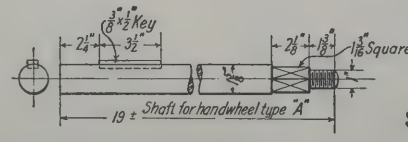
STEM



SECTION B-B



SECTION C-C



PINION SHAFT
Finish all over

City of New York
BOARD OF WATER SUPPLY

12-INCH AND 16-INCH GATE VALVES
REDUCTION GEARING AND INDICATORS

0 3 6 9 12 In

JUNE 25, 1917

Drawn E. N. F. A.B.
Traced W.S.
Checked R.E.E.

J. Howard Williams
Mech Eng

BWS 1403

Chaddeus Merriman
Dept Eng Hdqrs

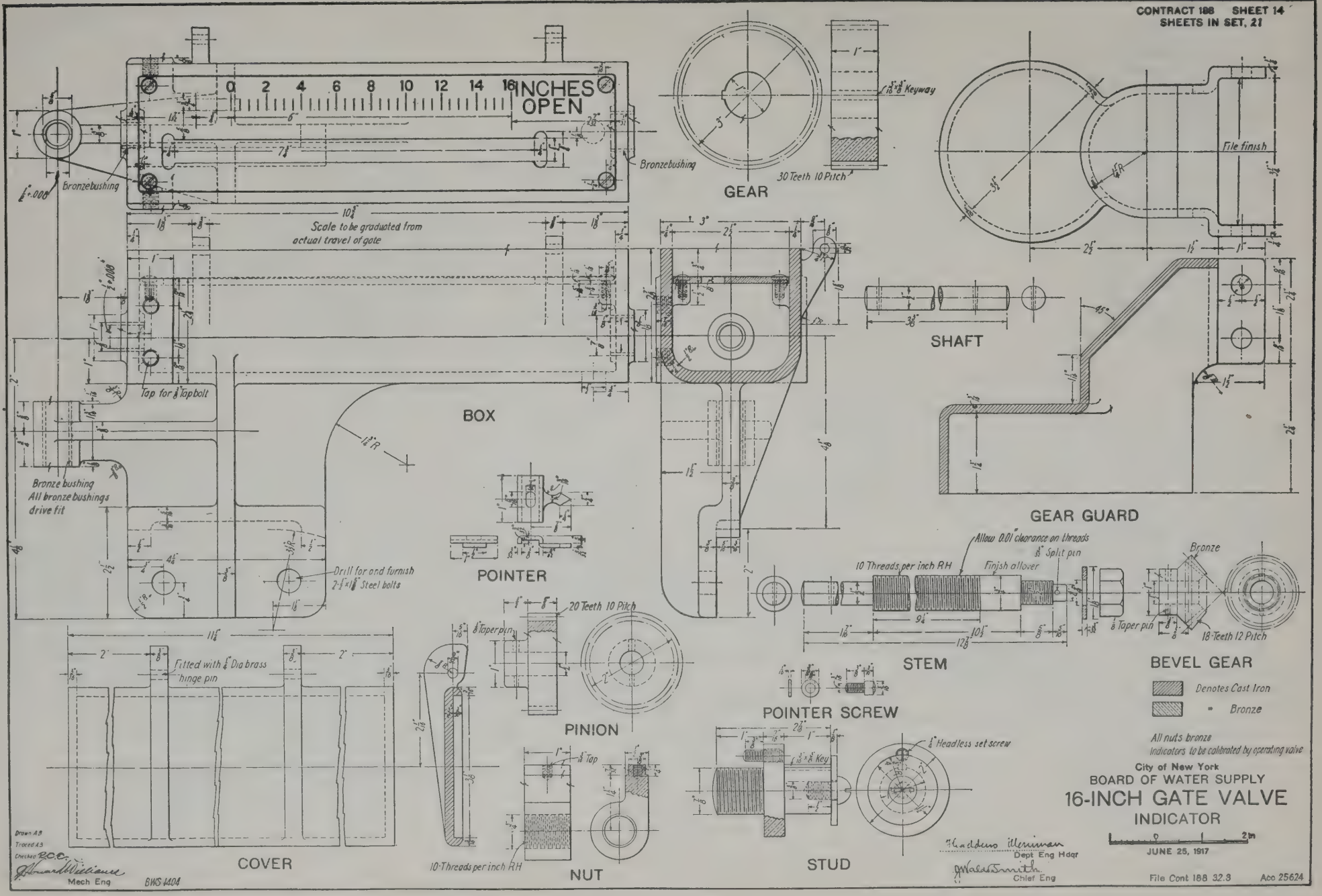
J. Waldo Smith
Chief Eng

File Cont 188-32.3

Acc 25623

Ref-Acc 19097

CONTRACT 188 SHEET 14
SHEETS IN SET, 21



City of New York
BOARD OF WATER SUPPLY

16-INCH GATE VALVE
INDICATOR

JUNE 25, 1917

Drawn AB
Traced AS
Checked BCC
Mech Eng

BWS 1404

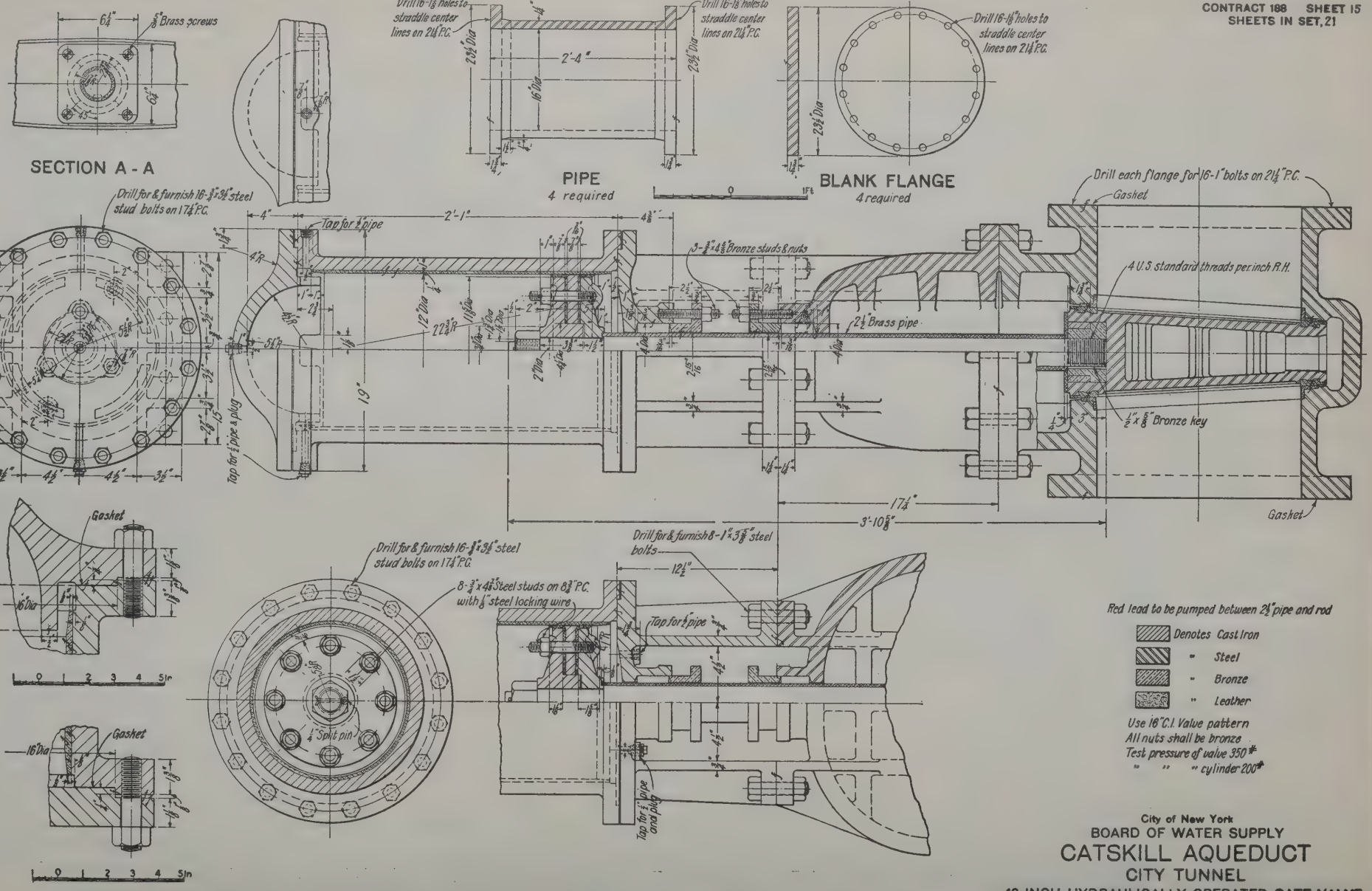
Dept Eng Hdqr

Chief Eng

File Cont 188 32.3

Acc 25624

CONTRACT 188 SHEET 15
SHEETS IN SET, 21


SECTION A - A
PIPE
4 required
BLANK FLANGE
4 required
Drill for & furnish 16-¾" ø 3½" steel stud bolts on 17¼" P.C.
Drill 16-1⅛" holes to straddle center lines on 21¼" P.C.
Drill each flange for 16-1" bolts on 21¼" P.C.
Gasket
Tap for ½" pipe
3-¾" x 4⅝" Bronze studs & nuts
4 U.S. standard threads per inch R.H.
2½" Brass pipe
½" x ⅝" Bronze key
Tap for ½" pipe & plug
Drill for & furnish 8-1" x 3⅜" steel bolts
8-¾" x 4½" Steel studs on 8¾" P.C. with ⅛" steel locking wire
1¼" Split pin
Tap for ½" pipe and plug
Red lead to be pumped between 2½" pipe and rod
Denotes Cast Iron
" Steel
" Bronze
" Leather
Use 16" C.I. Valve pattern
All nuts shall be bronze
Test pressure of valve 350#
" " " cylinder 200#

City of New York
BOARD OF WATER SUPPLY

CATSKILL AQUEDUCT

CITY TUNNEL

16-INCH HYDRAULICALLY OPERATED GATE VALVE

JUNE 25, 1917

Drawn F.H.d
Traced G.H.B.
Checked W.H.d

Mech. Eng.

BWS 1405

Thaddeus Merriman
Dept Eng Hdqrs

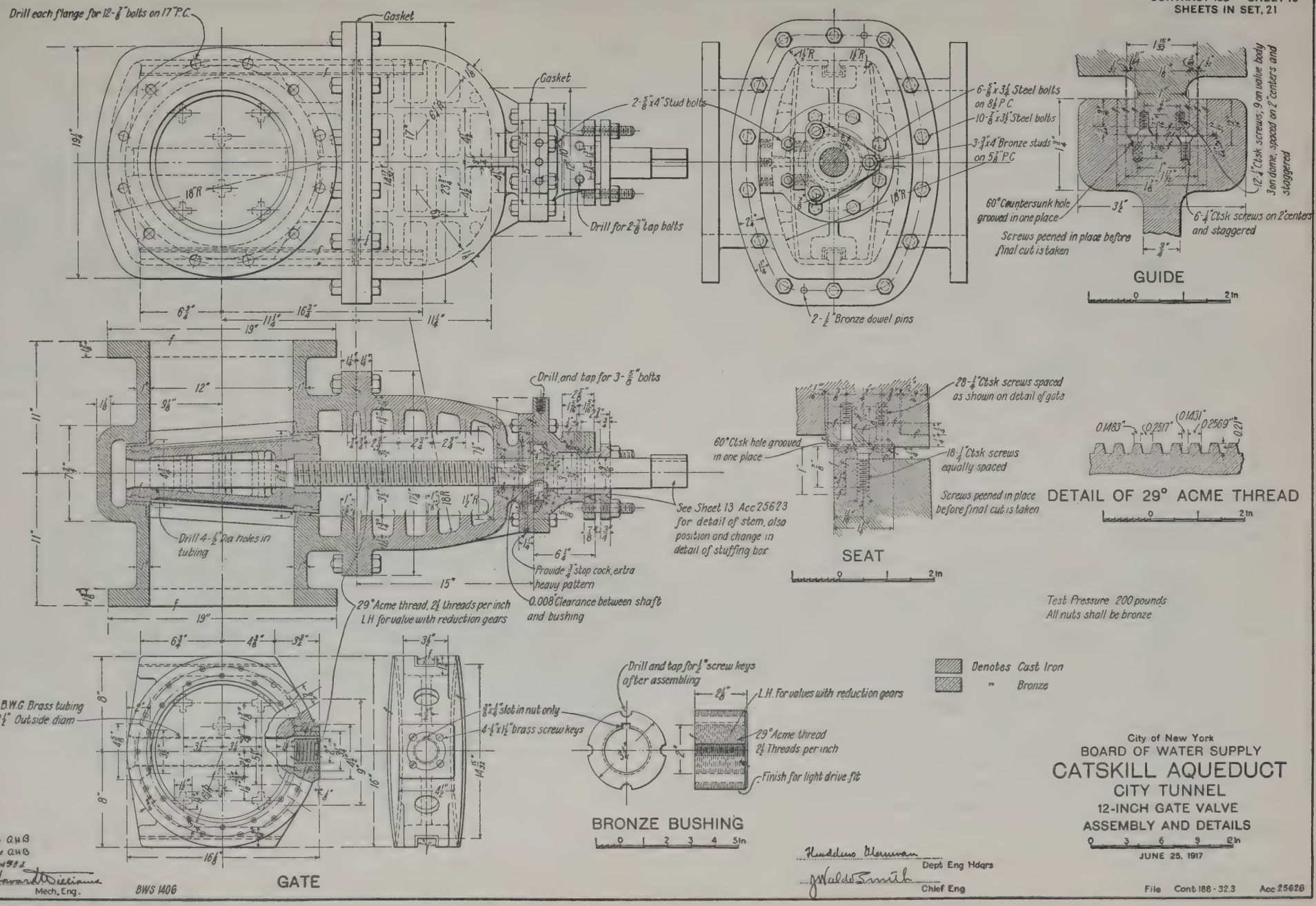
J. Waldo Smith
Chief Eng

File: Cont 188-32.3

Acc 25625

Ref - Acc 25414

CONTRACT 188 SHEET 16
SHEETS IN SET, 21


Drill each flange for 12-⅞" bolts on 17" P.C.
Gasket
Gasket
2-⅝"x4" Stud bolts
Drill for 2-⅞" tap bolts
6-⅝"x3¼ Steel bolts on 8¼ P.C
10-⅞"x3½" Steel bolts
3-¾"x4" Bronze studs on 5¼" P.C
2-½" Bronze dowel pins
60° Countersunk hole grooved in one place
Screws peened in place before final cut is taken
12-¼" Ctsk screws, 9 on valve body 3 on dome, spaced on 2" centers and staggered
6-¼" Ctsk screws on 2" centers and staggered
GUIDE
Drill and tap for 3-⅝" bolts
Drill 4-½" Dia holes in tubing
See Sheet 13 Acc 25623 for detail of stem, also position and change in detail of stuffing box
Provide ¾" stop cock, extra heavy pattern
0.008" Clearance between shaft and bushing
29° Acme thread, 2¼ threads per inch L.H. for valve with reduction gears
28-¼" Ctsk screws spaced as shown on detail of gate
60° Ctsk hole grooved in one place
18-¼" Ctsk screws equally spaced
Screws peened in place before final cut is taken
SEAT
0.1483" 0.2517" 0.1431" 0.2569" 0.221"
DETAIL OF 29° ACME THREAD
Test Pressure 200 pounds
All nuts shall be bronze
#16 B.W.G. Brass tubing 2½" Outside diam
⅜"x¼" slot in nut only
4-½"x1½" brass screw keys
GATE
Drill and tap for ½" screw keys after assembling
L.H. for valves with reduction gears
29° Acme thread 2¼ Threads per inch
Finish for light drive fit
BRONZE BUSHING
Denotes Cast Iron
" Bronze

City of New York
BOARD OF WATER SUPPLY

CATSKILL AQUEDUCT

CITY TUNNEL

12-INCH GATE VALVE

ASSEMBLY AND DETAILS

JUNE 25, 1917

Drawn G.H.B.
Traced G.H.B.
Checked W.J.L.

Mech. Eng.

BWS 1406

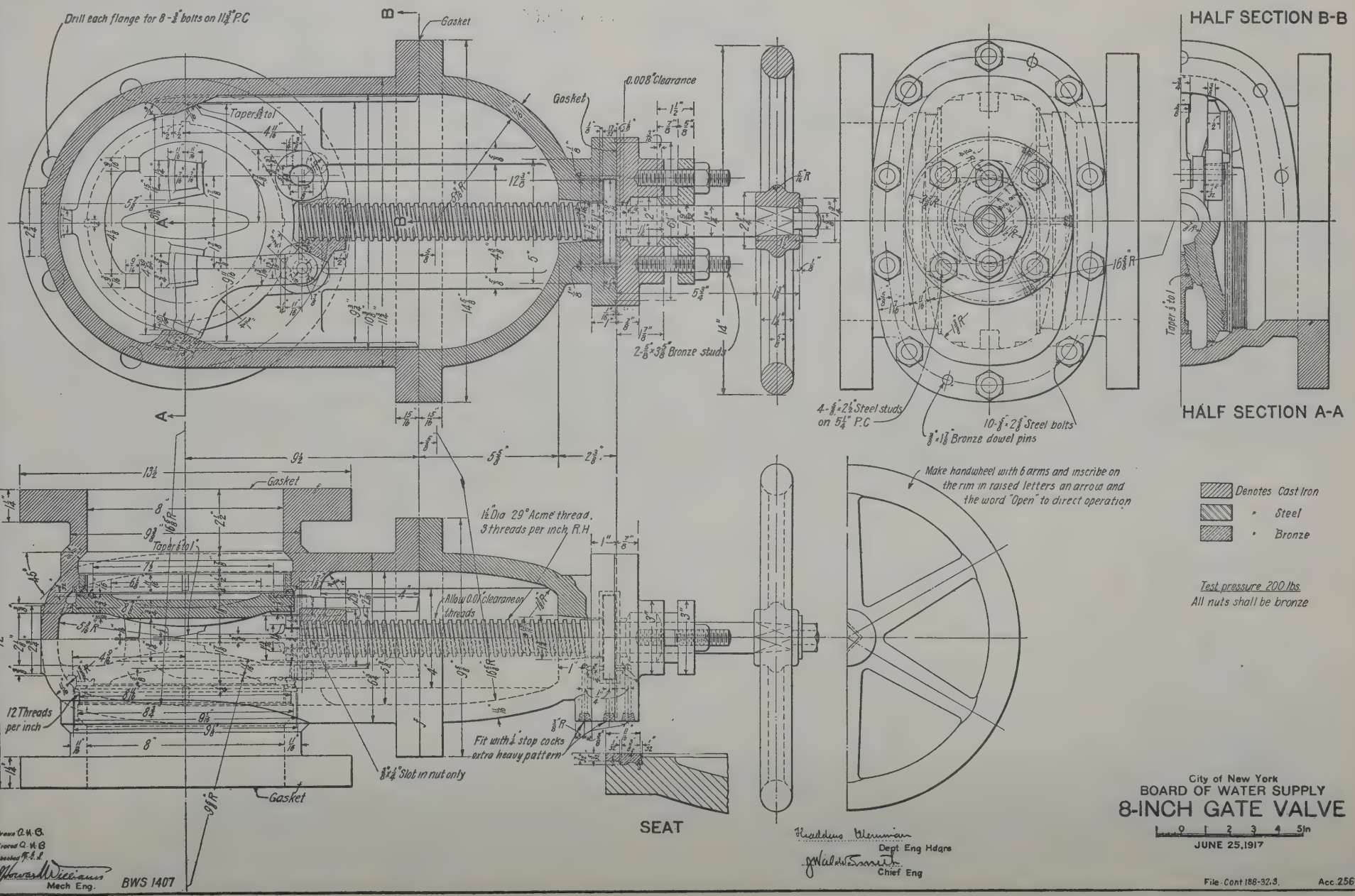
Dept Eng Hdqrs

Chief Eng

File Cont 188 - 32.3 Acc 25626

Ref - Acc 14198

CONTRACT 188 SHEET 17
SHEETS IN SET, 21


Drill each flange for 8 - ¾" bolts on 11¼" P.C
Gasket
Taper ½" to 1"
4 11/16"
12 3/8"
0.008" Clearance
Gasket
1½"
2 - ⅝" × 3⅜" Bronze studs
14"
HALF SECTION B-B
HALF SECTION A-A
4 - ⅝" × 2½" Steel studs on 5¼" P.C
10 - ⅝" × 2⅜" Steel bolts
⅜" × 1⅜" Bronze dowel pins
Taper ½" to 1"
13½
9½
5⅝"
2⅜"
Gasket
1½" Dia 29° Acme thread, 3 threads per inch R.H
Allow 0.01 clearance on threads
12 Threads per inch
⅝" × ¼" Slot in nut only
Fit with ¼" stop cocks extra heavy pattern
Gasket
SEAT
Make handwheel with 6 arms and inscribe on the rim in raised letters an arrow and the word "Open" to direct operation
Denotes Cast Iron
" Steel
" Bronze
Test pressure 200 lbs
All nuts shall be bronze

Drawn C.H.G.
Traced C.H.G.
Checked F.E.H.

Howard Wieciaus
Mech Eng.

BWS 1407

Reddens Klemmian
Dept Eng Hdqrs

J. Waldron Smith
Chief Eng

City of New York
BOARD OF WATER SUPPLY

8-INCH GATE VALVE

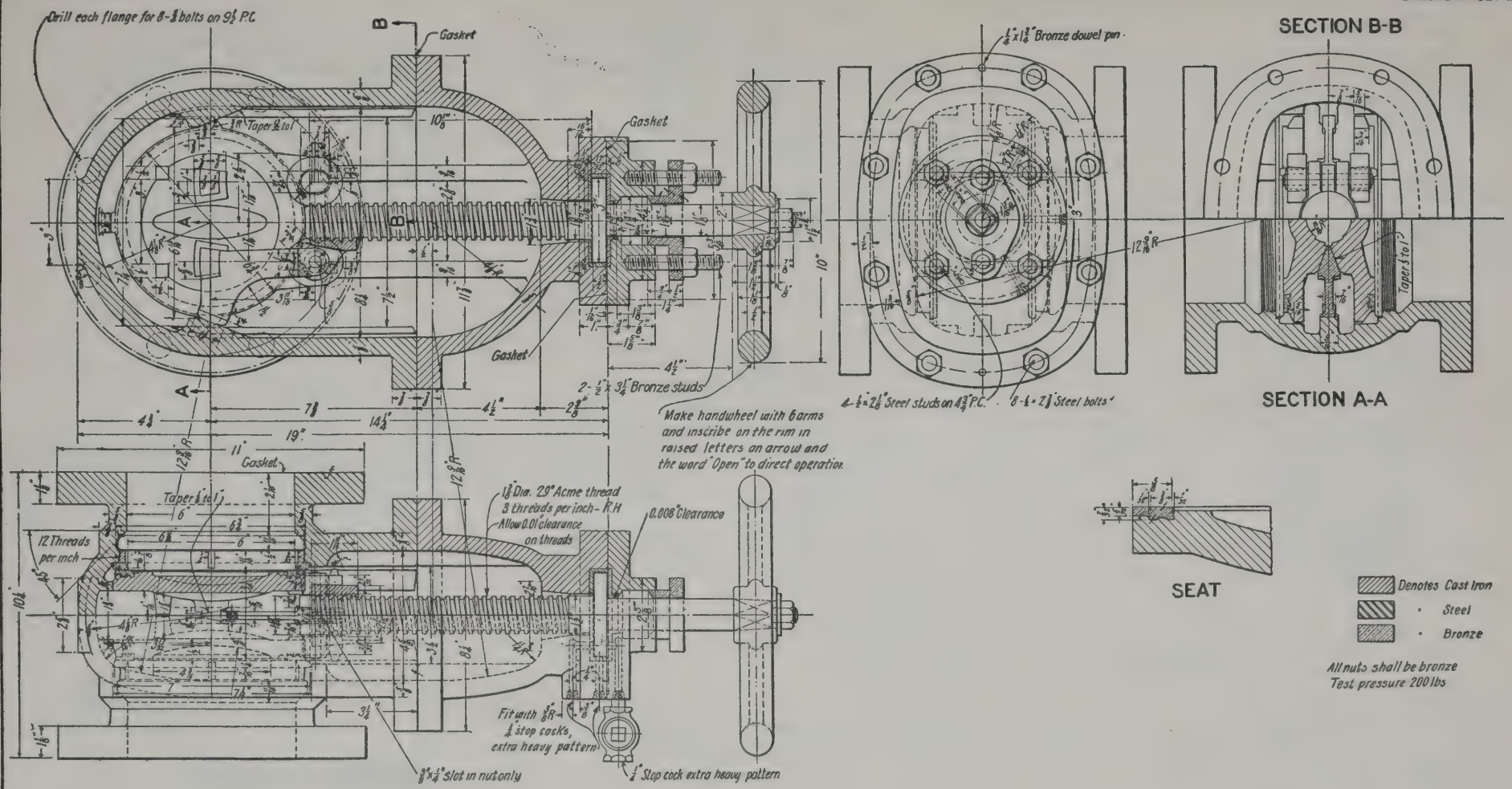
0 1 2 3 4 5 In

JUNE 25, 1917

File Cont 188-32.3. Acc. 25627

End - Acc. 12019

CONTRACT 188 SHEET 18
SHEETS IN SET 21


Drill each flange for 8-¾ bolts on 9½ P.C.
Gasket
Taper ¾ to 1
Gasket
Gasket
2-½ x 3¼ Bronze studs
4½"
Make handwheel with 6 arms and inscribe on the rim in raised letters an arrow and the word "Open" to direct operation.
1⅛ Dia. 29° Acme thread 3 threads per inch - R.H
Allow 0.01 clearance on threads
0.008 clearance
12 Threads per inch
Taper ¾ to 1
Gasket
Fit with ⅜ R ¼ stop cocks, extra heavy pattern
⅜ x ¼ Slot in nut only
¼ Stop cock extra heavy pattern
¼ x 1⅛ Bronze dowel pin
4-¾ x 2⅛ Steel studs on 4¾ P.C.
8-¾ x 2¼ Steel bolts
12⅜ R
SECTION B-B
Taper ¾ to 1
SECTION A-A
SEAT
Denotes Cast Iron
Steel
Bronze
All nuts shall be bronze
Test pressure 200 lbs

City of New York
BOARD OF WATER SUPPLY

6-INCH GATE VALVE

0 1 2 3 4 5 FT

JUNE 25, 1917

Drawn O.H.B
Traced O.H.B
Checked W.S.J

Mech. Eng.

BWS 1408

Dept. Eng Hdqrs

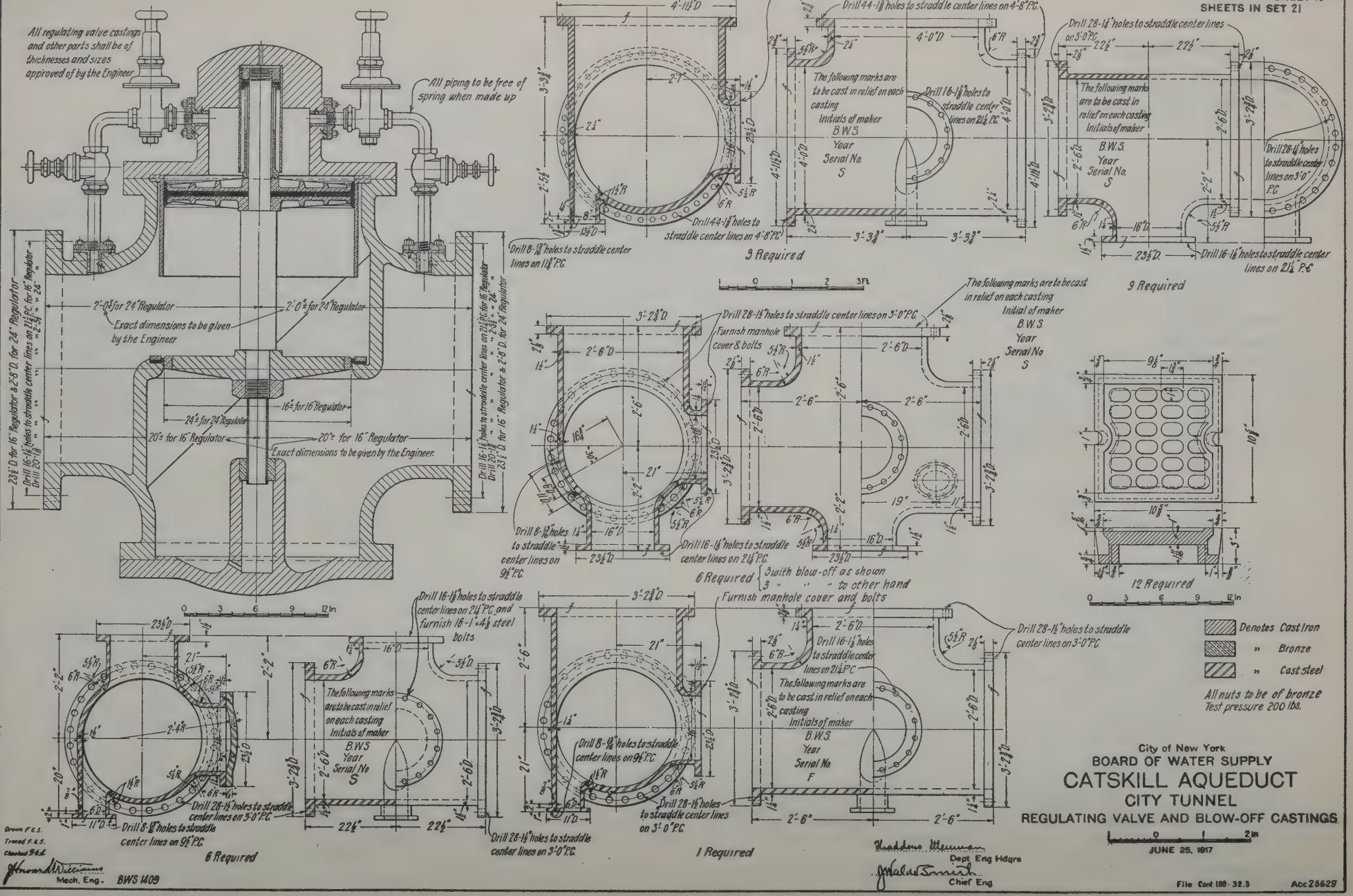
Chief Eng

File: Cont 188-32.3

Acc. 25628

Ref - Acc. 19100

CONTRACT 188 SHEET 19
SHEETS IN SET 21


All regulating valve castings and other parts shall be of thicknesses and sizes approved of by the Engineer
All piping to be free of spring when made up
2'-0½" for 24" Regulator
Exact dimensions to be given by the Engineer
16½" for 16" Regulator
24½" for 24" Regulator
20½" for 16" Regulator
Exact dimensions to be given by the Engineer.
Furnish manhole cover and bolts
Drill 44-1⅛" holes to straddle center lines on 4'-8" P.C.
The following marks are to be cast in relief on each casting
Initials of maker
B.W.S.
Year
Serial No.
S
Drill 16-1⅛" holes to straddle center lines on 2¼" P.C.
Drill 8-1⅛" holes to straddle center lines on 11½" P.C.
3 Required
Drill 28-1¼" holes to straddle center lines on 3'-0" P.C.
9 Required
Drill 28-1⅛" holes to straddle center lines on 3'-0" P.C.
Furnish manhole cover & bolts
6 Required
3 with blow-off as shown
3 " " " to other hand
12 Required
Drill 16-1⅛" holes to straddle center lines on 2¼" P.C. and furnish 16-1"-4½ steel bolts
Drill 8-⅞" holes to straddle center lines on 9½" P.C.
6 Required
Drill 8-1⅛" holes to straddle center lines on 9½" P.C.
1 Required
Denotes Cast Iron
" Bronze
" Cast Steel
All nuts to be of bronze
Test pressure 200 lbs.

City of New York
BOARD OF WATER SUPPLY

CATSKILL AQUEDUCT
CITY TUNNEL
REGULATING VALVE AND BLOW-OFF CASTINGS

JUNE 25, 1917

Drawn F.G.S.
Traced F.G.S.
Checked W.E.

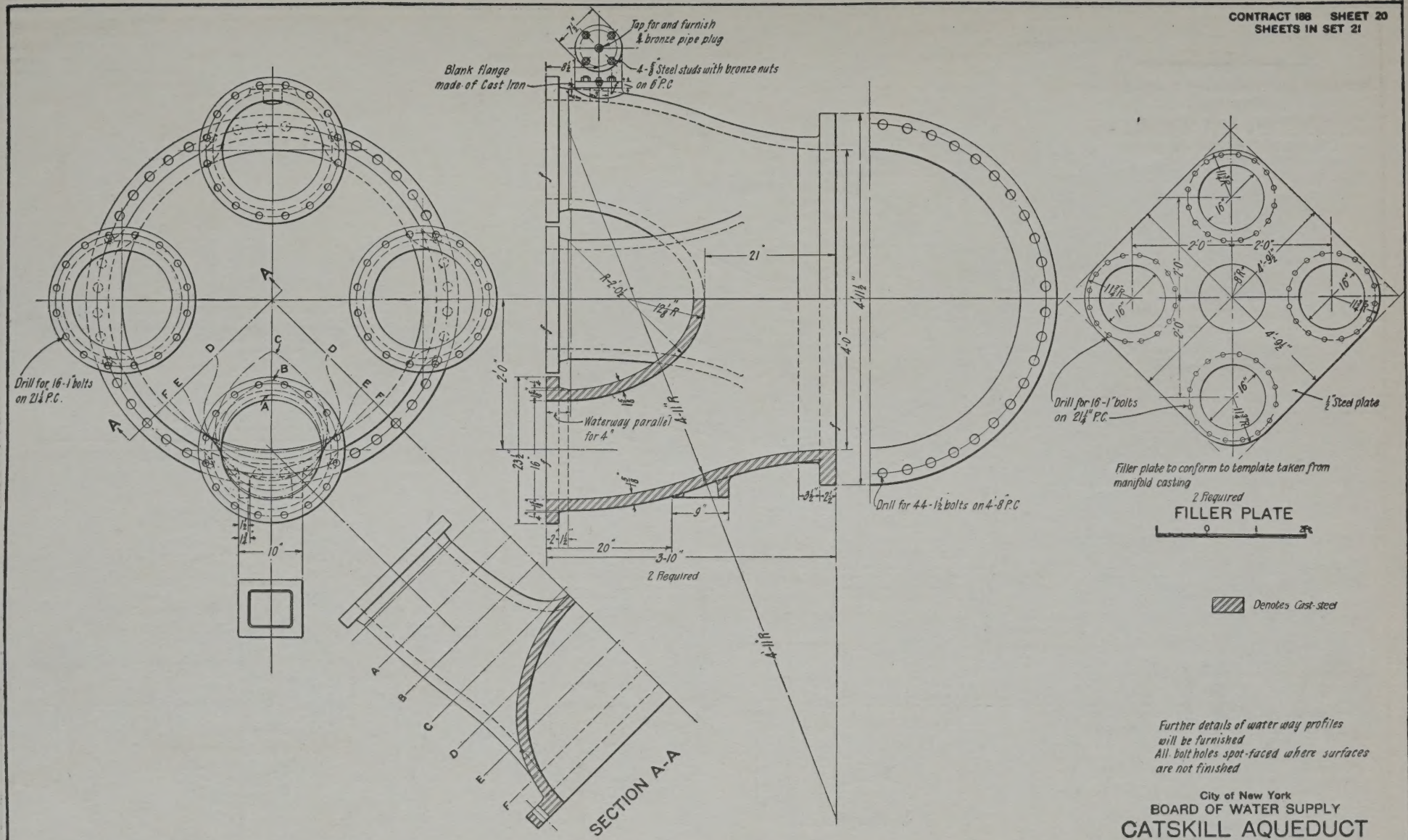
Mech. Eng. BWS 1409

Dept Eng Hdqrs

Chief Eng

File Cont 188-32.3 Acc 25629

CONTRACT 188 SHEET 20
SHEETS IN SET 21



Further details of water way profiles
will be furnished
All bolt holes spot-faced where surfaces
are not finished

City of New York
BOARD OF WATER SUPPLY
CATSKILL AQUEDUCT
CITY TUNNEL
MANIFOLD CASTING

JUNE 25, 1917

Drawn A.R.F.
Traced A.R.F.
Checked BOP

Mech. Eng.

BWS 1410

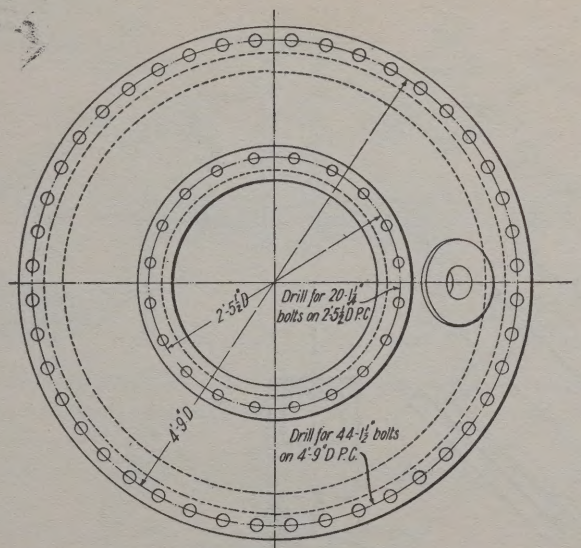
Headley Merriman
Dept Eng Hdqrs

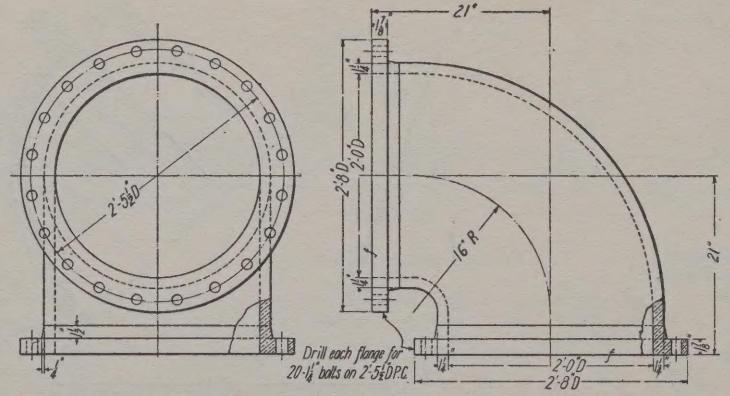
Chief Eng

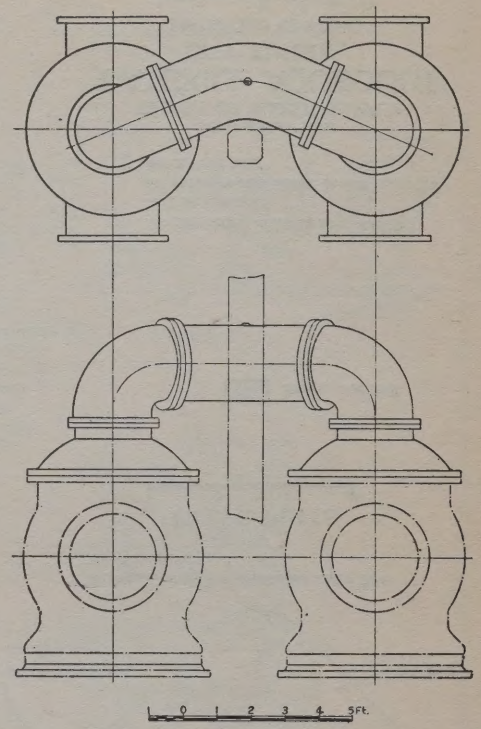
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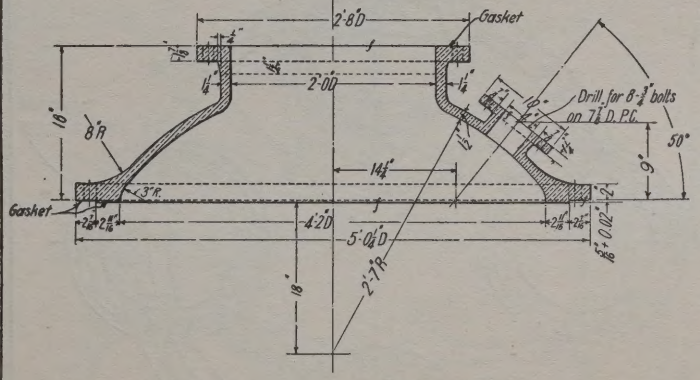
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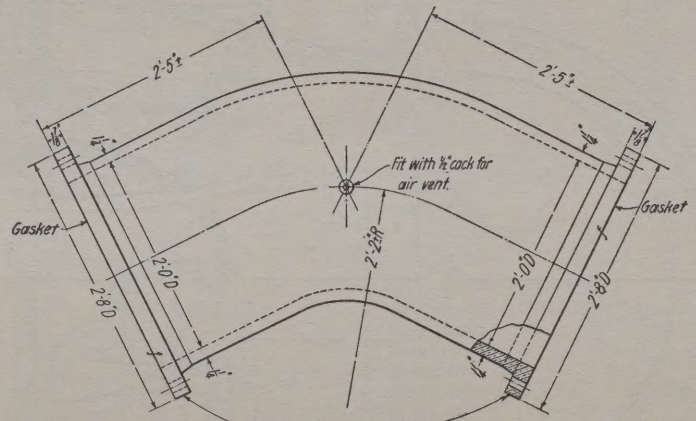
CONTRACT 188 SHEET 21
SHEETS IN SET. 21











Denotes Bronze

City of New York
BOARD OF WATER SUPPLY
CATSKILL AQUEDUCT
CITY TUNNEL
SHAFT CAP COVERS AND FITTINGS

0 1Ft.

JUNE 25. 1917

Drawn R.P.K.
Traced R.P.K.
Checked R.B.S.

Mech. Eng.

BWS 1411

Dept Eng Hdqrs

Chief Eng

File Cont 188-54384 Acc 25631

Ref - Acc 25398.

UNIVERSITY OF ILLINOIS-URBANA
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No. 188

THE CITY OF NEW YORK

BOARD OF WATER SUPPLY

CONTRACT AND DRAWINGS

For furnishing and delivering gate and pressure-regulating valves and appurtenances for the City tunnel of the Catskill aqueduct, in the City of New York

.....

Contractor

Dated *1917*

Assigned to .....

APPROVED AS TO FORM

.....

Acting Corporation Counsel

Dated *1917*

EXAMINED AND FOUND CORRECT

.....

Contract Clerk

Entered in the Comptroller's Office,

..... *1917*

.....

First Assistant Bookkeeper